# VETERINARY MEDICINE

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The Influence of Disease on the Swine Industry

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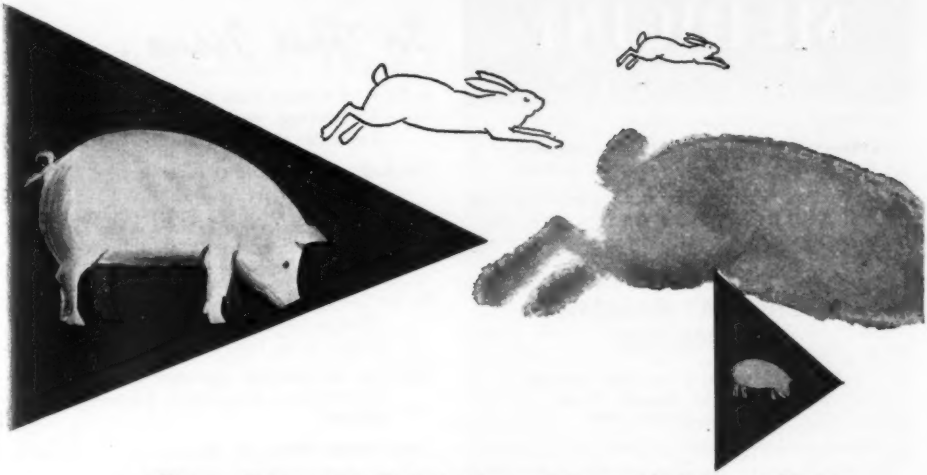

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# VETERINARY MEDICINE

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# A Study Of Canine Fecal Examinations

LEON F. WHITNEY, D.V.M., GEORGE D. WHITNEY, D.V.M., and LESTER MARTIN,
Orange, Connecticut

IN a previous issue of VETERINARY MEDICINE, the senior author published a report entitled A Study of 1,000 Fecal Examination Reports[1]. This was the result of examinations made from stools sent to a commercial dog food manufacturer. They came from all over the East; only a few were local, and those were mostly examined for two local professionals. All were supposed and assumed to be dog stools.

A total of 1,492 dogs were represented, of which 610 were negative; 312 harbored roundworms; 268, hookworms; 350, whipworms; 268, tapeworms; 64, coccidia; and 14, pinworms. (The ova were definitely those of pinworms. They were diagnosed as such by two parasitologists.) This work was all done before the author had attended veterinary college.

The present study was made by two veterinarians and a technician. The authors are not parasitologists and make no pretense of being acquainted with the voluminous literature dealing with the subjects of this paper. The study was made with the results shown, some of which, at least, seem to have some practical value.

The investigation represents over 4,000 examinations. Of these, 3,484 were complete as to all the details on our record blanks—breed, age, date and infestation, and whether negative or infested; while 3,847 were complete enough to use in obtaining other useful information. All these specimens were brought to the Whitney Veterinary Clinic or passed by dogs left to board or to be dewormed. Almost all, therefore, are local in character.

Besides the fecal examinations represented in this study, many thousands more have been made during the same period, using the flat smear method, of feces which stuck to thermometers or from small samples removed with curettes. None of these was included in this study, but the value of the flat smear method compared with the properly conducted centrifuged-flotation method was evaluated.

The dogs represented are not necessarily those suspected of "having worms." Often they are, and the fecal examination shows them to be negative. This is a routine procedure with every dog brought for an examination of any kind, if the client brings a fecal sample, and with those brought to the Whitney Veterinary Clinic to board. This routine helps to protect our runs from contamination.

Our record sheets for fecal examinations, printed and made into pads, are used only for centrifuged examinations. Clients who do not bring their dogs' fecal matter are told that a worth-while test is not possible when made from a thermometer or instrument smear. Study has convinced us and many clients that this is so. They soon learn the value of one properly made fecal examination and bring the stools. Occasionally the writers resort to removal of feces from the rectum with an enema.

The present study was made on International Business Machines equipment after being outlined in cooperation with Dr. John H. Watkins of the Public Health Department of the Yale Medical School. Each record was punched on a card according to a set of numbers and columns. The cards were then run through a sorting machine and the desired correlations made. In the event that other correlations and calculations than those which were used are desired, the cards are available to any interested student for his use, and he is welcome to them.

There are enough dogs represented to be a good cross section of the canine populations in south central Connecticut. It will be interesting to compare infestations with dogs in other sections when such studies are published.

A uniform procedure is followed in each examination. About 2 gm. of feces are thoroughly mixed with about 20 cc. of a saturated solution of sodium nitrate (specific gravity 1.35 or above). This is strained through a gauze and then poured into an electric centrifuge in which it is spun at top speed for about 90 seconds to two minutes. With a loop made of fine gauge wire, a portion of surface is removed from the center of the surface of the tube, transferred to a microscope slide, and examined first at 140 magnifications and then at 500, if necessary for closer identification. Each specimen is recorded on a blank of the type mentioned above and the severity of the infestation recorded by X's. One X indicates

the bare presence of the parasite as determined by the finding of a very few ova. Two X's mean light infestation but deserving deworming. Three X's mean severe; four X's, very heavy.

### Parasites Identified from Ova

*Roundworms.* The degree of infestation shows 38.4% of 39 litters of puppies under three weeks of age harboring roundworms old enough to reproduce. Thirty-nine litters are represented, the fecal samples being a composite of the whole. This may indicate that these puppies were infested while still embryos.

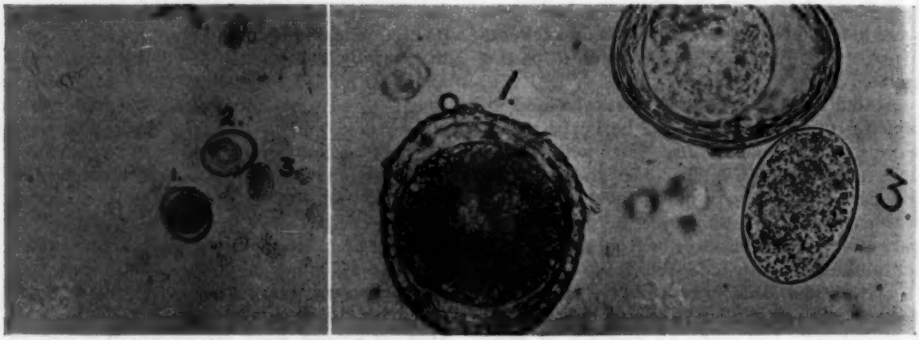


Fig. 1. Parasitic ova observed in a single microscopic field of a preparation made from the feces of a dog. (1) *Belascaris marginata.* (2) *Toxascaris limbata.* (3) *Uncinaria stenocephala.* (Left) Low power - x 100. (Right) High power - x 400. *After* Benbrook.

During the 4- to 11-week stage, the incidence increased to 50.1%. These were puppies which were infested before and after birth. From this high point the degree of infestation diminished with the age of the group. The 10-15-year group, with only 41 dogs represented, is too small to be significant, but it does show that age is no deterrent to the animals becoming infested, even though there may be some resistance to the parasite.

*Hookworms.* Here again it was found that young puppies were harboring parasites which must have entered their bodies while they were embryonic. Three weeks after the puppies' birth the hookworms apparently were reproducing. It was significant that approximately the same percentage of dogs were found infested at all ages—close to 20%. This infestation, however, is no indication of the effects wrought by the parasites. The younger the puppy, the more severe the effects. Older dogs seemed far less harmed by infestations represented by an equal number of X's.

*Whipworms.* The fact that no whipworm ova were found in puppies under three weeks of age lends evidence to the belief that there is no uterine infestation and that whipworm infestation is, as is commonly accepted, direct from the egg without an extra-intestinal phase. Each age group, up to the three-year group, showed increasing infestation so that it may be concluded that whipworm disease tends to be an ailment of adults; nor do the adults seem to develop resistance as in the case of roundworms. Many old dogs are kept on a sub-par basis of health for years and show rapid improvement when these parasites are eliminated or even greatly reduced.

*Tapeworms. Dipylidium caninum* infestations are encountered at an early age and appear to be due to infested fleas from the mother crawling into the mouths of newborn puppies. The scolices from such tapeworms grow large enough within three weeks to shed proglottids. It is felt that a much higher percentage of dogs than the average of 14.3%, which this study indicates, is infested. Obviously many Dipylidium tapeworm infestations are missed entirely. Many times the proglottids are seen on stools submitted, but no ova can be found. It is concluded that the finding of these segments is the only safe diagnostic method unless eggs happen to be found. Every client is carefully made to understand this fact, and then they do not telephone to tell us that we said the dog did not have worms but we were wrong. A goodly number of specimens with ova of this parasite were found but most of them were missed completely.

In deworming, arecoline hydrobromide is often used as a physic to follow tetrachlorethylene, and tapeworms are occasionally found in the evacuations; tapeworms which had not made their presence known either by fecal examinations or gross proglottids in the stool. Dogs do not appear to build immunity

to these parasites, as frequently large numbers are removed from dogs of all ages.

*Taenia pisiformis* is found in a much smaller number of cases than the flea-host worm and then almost exclusively in farm dogs or rabbit hounds whose owners know no better than to feed them raw rabbit carcasses. A few Setters are represented and several Foxhounds and Coonhounds; possibly dogs which had killed or

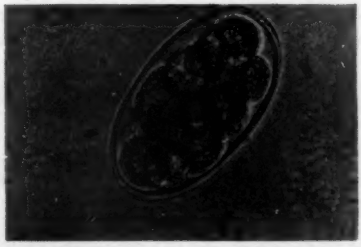

Fig. 2. Ovum of the hookworm of the dog, *Ancylostoma caninum* - x 400. *After* Benbrook.

come across rabbit carcasses in the woods while hunting for other game. *T. pisiformis* ova are often found in stools from animals whose owners had never noticed proglottids.

Several other species of tapeworm have been found when deworming or in fecal examinations, but they are rare.

*Coccidia. Isospora rivolta* was found most commonly in older puppies—none in those under three weeks of age. *I. bigemina* was most severe in the one-year group, while *I. felis* was the common disease of young puppies—even in those under three weeks of age. A number of pet store litters were infested. *I. felis* was rarely found in older dogs. In general, it was found that the older the puppy, the less severe is his reaction to coccidia infection.

It has often been said that older dogs rarely are found infested because they have built up an immunity against coccidiosis. The authors' findings do not support such a contention. They are interpreted as showing that age alone confers resistance.

It is surprising how often this disease produces a group of symptoms approximating those of distemper due to the virus of Carré. Puppies are often presented sniffling, with eyes sometimes gummed together, along with loss of appetite, emaciation, diarrhea, and dehydration. These are the symptoms the owners have read in their dog books as the textbook picture of distemper. The syndrome of coccidiosis with secondary invaders is sufficiently similar to that of distemper, even to a veterinarian, to point up the necessity for a centrifuged fecal examination as an aid in differentiation.

Identification of coccidia oocysts was made by comparing their relative size and shape with a textbook diagram. It is quite possible that the authors could have made errors in this

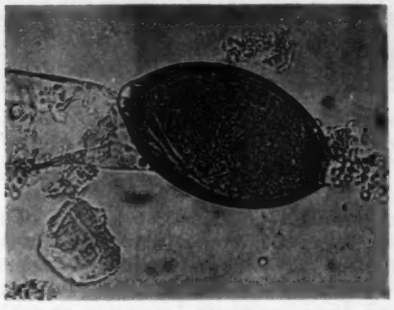

Fig. 3. Ovum of the whipworm of the dog, *Trichuris depressiuscula* - x 400. *After* Benbrook.

field, none of them being parasitologists. Quite likely, there were included some other species

TABLE 1. Percentage of Dogs Infested with Intestinal Parasites at Different Ages

| Age | Roundworms | Hookworms | Whipworms | Tapeworms | | Coccidia | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Flea-Host | Rabbit-Host | rivolta | bigemina | felis |
| 0- 3 wk. | 38.4 | 20.5 | 0 | 2.5 | 0 | 0 | 0 | 7.6 |
| 4-11 wk. | 50.1 | 17.7 | 4.1 | 9.1 | 0.8 | 8.4 | 0.7 | 6.0 |
| 12-23 wk. | 41.0 | 19.7 | 8.8 | 9.7 | 1.1 | 6.1 | 1.1 | 5.2 |
| 24-51 wk. | 26.6 | 13.6 | 23.8 | 14.1 | 1.1 | 2.4 | 1.1 | 2.8 |
| 1 yr. | 16.7 | 20.0 | 28.2 | 12.0 | 2.7 | 1.0 | 2.8 | 2.5 |
| 2 yr. | 17.3 | 21.0 | 28.1 | 8.0 | 4.4 | 0.9 | 0.5 | 0.9 |
| 3 yr. | 14.4 | 22.7 | 31.4 | 16.6 | 3.6 | 0.7 | 0.9 | 0.4 |
| 4 yr. | 13.5 | 30.0 | 27.0 | 13.5 | 4.5 | 1.5 | 0.7 | 0 |
| 5 yr. | 5.5 | 16.6 | 31.4 | 16.6 | 1.8 | 1.8 | 0 | 1.8 |
| 6 yr. | 9.7 | 17.7 | 30.0 | 15.9 | 0.9 | 1.7 | 0 | 0.9 |
| 7 yr. | 5.5 | 22.2 | 33.3 | 13.8 | 2.7 | 0 | 0 | 0 |
| 8 yr. | 9.2 | 18.6 | 44.0 | 16.2 | 0 | 0 | 0 | 0 |
| 9 yr. | 7.8 | 34.1 | 21.0 | 10.5 | 0 | 2.6 | 0 | 0 |
| 10-15 yr. | 24.2 | 10.8 | 26.8 | 20.6 | 7.3 | 0 | 0 | 0 |

in the three forms identified. Perhaps it would have been better to have lumped all coccidia under one heading. *I. felis,* however, is so much larger than the other forms that it is felt to be worth-while to attempt this separation.

*Other Parasites.* Small numbers of *Strongyloides stercoralis* were found. Poultry parasite ova were identified in many cases in farm dogs which had probably eaten poultry manure, and there were ova of parasites we could not identify.

In the 1936 study, 13 cases of *Strongyloides stercoralis* were found. Many of these came from a kennel on Staten Island. One of the cases found in this study ten years later was a Beagle which it was learned upon inquiry, was a grandson of a dog bred by the Staten Island kennel and sold in a town near New Haven. The rather rare infestation was still plaguing this strain.

Regarding pinworms, the senior author, soon after establishing his practice, was made to realize that he had been previously "hoodwinked." A woman brought a stool to the clinic which showed pinworm eggs. She was asked whether this was not the stool of her child and admitted that it was. Since then a number of clients have tried the same trick but without success. So that is most likely the explanation of the pinworm eggs found in the 1936 study; people had taken advantage of the opportunity afforded and had sent children's stools instead of dogs'. This upsets the percentages in the 1936 study to a slight extent.

Several clients whose children were known to have pinworms, including the one mentioned as attempting to deceive us, had dogs; and the animals' stools were examined with great care. None showed pinworm ova.

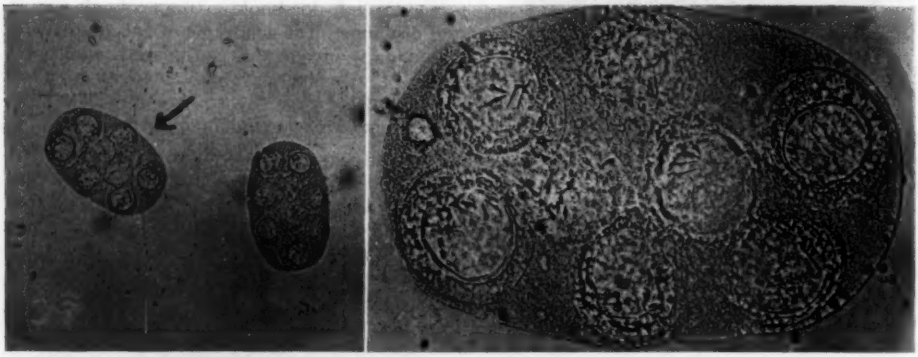

Fig. 4. Ova packets of one of the most common tapeworms of the dog, *Dipylidium caninum.* The eggs are contained in the packet, which are observed on the rupture of a mature proglottid. It is not always possible to identify these parasites on fecal examination by flotation. (Left) low power - x 100. (Right) High power - x 400. *After* Benbrook.

## Breed Differences in Susceptibility

It is interesting to compare the percentages of the breeds for which fecal examinations were made with the percentage of these breeds

TABLE 2. Estimated Probability of Intestinal Parasite Infestation at any Age by Percent

| Age | Roundworms | Hookworms | Whipworms | Tapeworms | | Coccidia | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Flea-Host | Rabbit-Host | rivolta | bigemina | felis |
| 0- 3 wk. | 40 | 20 | 0 | 3 | 0 | 0 | 0 | 8 |
| 4-11 wk. | 50 | 20 | 5 | 9 | 1 | 9 | 1 | 7 |
| 12-23 wk. | 42 | 20 | 10 | 10 | 1 | 6 | 1 | 5 |
| 24-51 wk. | 27 | 20 | 25 | 14 | 1 | 3 | 2 | 3 |
| 1 yr. | 17 | 20 | 28 | 14 | 3 | 2 | 3 | 3 |
| 2 yr. | 16 | 20 | 30 | 14 | 5 | 2 | 1 | 2 |
| 3 yr. | 15 | 20 | 30 | 14 | 4 | 2 | 1 | 1 |
| 4 yr. | 14 | 20 | 30 | 14 | 4 | 2 | 1 | 1 |
| 5 yr. | 13 | 20 | 30 | 14 | 3 | 2 | 0 | 1 |
| 6 yr. | 12 | 20 | 30 | 14 | 2 | 2 | 0 | 1 |
| 7 yr. | 11 | 20 | 30 | 14 | 1 | 1 | 0 | 0 |
| 8 yr. | 10 | 20 | 30 | 14 | 0 | 1 | 0 | 0 |
| 9 yr. | 9 | 20 | 30 | 14 | 0 | 1 | 0 | 0 |
| 10-15 yr. | 8 | 20 | 30 | 14 | 0 | 1 | 0 | 0 |

in the general dog population, the latter having been determined for a previous study. Dog cards numbering 5,852 from the Whitney Veterinary Clinic were used out of a total of over 20,000 active cards, and the breeds were tabulated. In table 3 the comparison is given. Mongrels are omitted except in cases where resemblance to the breed standard is sufficiently close to allow them to pass as purebred dogs. Many dogs recorded as Spitz, American Fox Terriers, Poodles, and Farm Shepherds are certainly mongrels, but pass for typical specimens. Few of the Poodles are of the standard type since that breed is an insignificant part of our dog population. Nearly all standard Poodles are well cared for.

The comparison in table 4 shows the newest of the popular breeds—the Boxer—to be the best cared for breed.

### Some Practical Observations

*Value of Garlic.* It is no exaggeration to say that thousands of persons have implicit confidence in garlic as an anthelmintic. Many Americans of Italian descent place great faith in it, and a large part of the population of New Haven and the area served by the Whitney Veterinary Clinic is composed of people of Italian extraction. Italians use garlic liberally in cooking. Therefore, it is not surprising that so many dogs brought to us have been heavily dosed with garlic, some so regularly that they exhale a garlic odor on their breaths and seem to have it in anal gland secretions. Many people on whose dogs' breaths we smelled garlic were queried as to how much and how often garlic cloves or oil were included in the animals' diets. Then examinations were carried out with added interest to determine whether intestinal parasites were present. A great many owners whose dogs were found heavily parasitized have expressed amazement that such could be the case, because garlic had been given regularly.

There seems to be a tendency for tapeworms to drop off a good many segments after a dose of garlic, but the scolices are not expelled. The segments thus seen give false assurance of a successful deworming.

In conclusion, with regard to garlic as an anthelmintic for dogs, its value was found to be practically nil at the levels commonly used in home medications. In fact, no case is known where it has been successfully used by any of our clients.

*Home Deworming.* Most of the free, drugstore, dog books, and some others, keep the public aware that when a dog pulls himself along with his front legs while sitting down he definitely "has worms." No such correlation was found. Sliding is usually due to enlarged, irritated, or overdistended anal glands which healthy dogs are constantly endeavoring to reduce. Pressure on such glands releases the material with which they are filled and gives relief. The stools of hundreds of dogs whose owners thought they had had worms because they behaved in this manner were examined, only to reveal that the animals were completely free of worms. Doubtless, thousands of dogs are unnecessarily dewormed at home each year because of this mistaken notion on the part of the public.

**TABLE 3. Fecal Examinations by Breeds**

| Breed | Number fecal exam. | % fecal exam. | % of dog pop. |
|---|---|---|---|
| Cocker | 772 | 23.0 | 26.2 |
| Boxer | 291 | 8.7 | 2.9 |
| Beagle | 208 | 6.2 | 4.9 |
| Farm Shepherd | 172 | 5.1 | 7.2 |
| Hounds (Fox and Coon) | 152 | 4.5 | 2.0 |
| German Shepherd | 151 | 4.5 | 3.3 |
| Collie | 147 | 4.4 | 5.7 |
| English Setter | 140 | 4.2 | 4.2 |
| Great Dane | 129 | 3.8 | 1.4 |
| Springer Spaniel | 129 | 3.8 | 1.9 |
| Fox Terrier | 101 | 3.3 | 7.5 |
| Bulldog | 94 | 2.8 | 1.1 |
| Irish Setter | 90 | 2.7 | 2.3 |
| Boston Terrier | 84 | 2.5 | 3.7 |
| Wire-Haired Terrier | 75 | 2.2 | 3.1 |
| Dachshund | 66 | 2.0 | 2.1 |
| Doberman Pinscher | 60 | 1.8 | 1.7 |
| Spitz Type | 51 | 1.5 | 5.7 |
| Pointer | 48 | 1.4 | .9 |
| Dalmatian | 36 | 1.1 | .6 |
| Poodle | 34 | 1.0 | 2.4 |
| Airedale | 33 | 1.0 | .9 |
| Pomeranian | 25 | .7 | 2.2 |

True, occasionally tapeworm proglottids are recovered when anal pouches are expressed, and it is probable that these do cause irritation and itching; but such findings seem rare. Again, clients present dogs they have repeatedly dewormed because they "dragged themselves," and they report that deworming failed to stop it. Expressing the anal glands offered relief in most cases.

Another strange idea of laymen is that one deworming is akin to vaccination, in that it eliminates parasites for the dog's life. Returning with a rundown dog, they often say, "But you dewormed him only six months ago; you couldn't have gotten all the worms." Also many clients request "shots for worms."

All too often for their dog's good, owners deworm at the first indication of the pet's indisposition. Even a slight inappetence may be the signal to buy worm pills. So often, also, the directions accompanying the medicine are completely disregarded. The capsules or pills are given on full stomachs without results, the subsequent assumption being that the pet has no worms.

Another common reason for home deworming failure, and its often tragic results, is the ignorance on the public's part that milk is food. All solid food may be withheld but milk ("I never knew it was food") be fed *ad lib.* Or the dog may drink the cat's milk and tetrachlorethylene capsules be given. Soon after, the pet owner is ready to sue the drug manufacturer for his own failure to read directions or to understand that milk is food. These are strong reasons for discouraging home deworming with tetrachlorethylene by any but intelligent owners.

**TABLE 4. Care by Owners as Revealed by Fecal Examinations**

| Breed | % of dog pop. | % fecal exam. | Quota fulfillment |
|---|---|---|---|
| English Setters | 4.2 | 4.2 | 100 |
| Boxers | 2.9 | 8.7 | 33 |
| Great Danes | 1.4 | 3.8 | 36 |
| Bulldogs | 1.1 | 2.8 | 38 |
| Hounds (Fox and Coon) | 2.0 | 4.5 | 44 |
| Springer Spaniels | 1.9 | 3.8 | 50 |
| German Shepherds | 3.3 | 4.5 | 73 |
| Beagles | 4.9 | 6.2 | 79 |
| Cocker Spaniels | 26.2 | 23.0 | 113 |
| Collies | 5.7 | 4.4 | 129 |
| Wire-Haired Terriers | 3.1 | 2.2 | 140 |
| Farm Shepherds | 7.2 | 5.1 | 141 |
| Boston Terriers | 3.7 | 2.5 | 148 |
| American Fox Terriers | 7.5 | 3.3 | 227 |
| Poodles | 2.4 | 1.0 | 240 |
| Pomeranians | 2.2 | .7 | 314 |
| Spitz Type | 5.7 | 1.5 | 380 |

Clients whose dogs have infested their own premises have to be taught that deworming is only part of the job; the patient must be prevented from becoming reinfested. Not a few think that the parasite eggs from one dog cannot infest the same animal and often blame the neighbor's pet for infesting their premises.

*Concrete Runs.* Probably the most seriously infested dogs and premises of kennels and homes are those in which the dogs defecate on concrete. Kennel owners often install concrete runs in the false notion that they will end worm troubles, not realizing that worm eggs are so small that thousands can remain on a foot of surface, secure in the concrete pores, and that hoes and brooms simply scrape and brush over them without touching them. Very few kennel owners who have installed concrete bother to scrub and wash or burn the surface sufficiently to clean it of all worm eggs.

Individuals whose dogs defecate on the cellar floor think they have cleaned it when they remove the stool. The eggs in the surface incubate and reinfestations occur in animals whose owners believe they are being immaculately clean. Installing concrete and feeling it has solved the intestinal parasite problem is indeed living in a fool's paradise.

Grass runs, too, are improper if the infestation of the dogs is a criterion, but even they are not as bad as concrete. Sand runs from which stools are removed twice daily and with which a little sand is also removed seem to keep the dogs freest from reinfestation.

### Flat Smear *versus* Flotation Readings

During the period when the 4,000 fecal examinations here reported were being made, several thousand flat smears were also read. No record was kept of the exact number, but for several years they were done at the rate of from one to five a day. Such examinations were made from samples of feces left on thermometers after temperature readings and from small curetted samples, when clients brought no specimens of stools with their dogs. Today the authors seldom bother with such examinations because of their earlier findings.

By recording the smear findings from a dog and later comparing them with those obtained by the more accurate flotation method when an adequate stool sample was available, convincing evidence was obtained that, not only was the flotation method far more rapid, but the smear method was often worthless. Repeatedly no ova were found in smears even after long searching; a flotation examination later might reveal an XXX infestation.

The best that can be said for the smear method is that, if ova are found, it is known that the dog has worms; but how badly infested he is cannot be stated with any degree of accuracy. It might even be concluded that infestation was so slight that deworming was unnecessary, whereas a flotation study might reveal an imperative need for it. If no ova are found using the smear method, it is not known whether the dog has worms or not. The flota-

(*Continued on page* 418)

# The Role Of Animals In Q Fever

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Q FEVER is an acute rickettsial disease of man. In man it is caused by a specific Rickettsia which is resident in nature and is found to cause inapparent infections in many species of animals. From the epidemiological viewpoint, infected sheep, goats and cows are important as the probable source of the infection in man. Consideration of some of the factors supporting this premise will be presented in this paper.

It is interesting to note that two original investigations led to the identification of the Rickettsia responsible for Q fever. These occurred in the same year, on opposite sides of the world and independently. Derrick,[1] in 1935, investigating an outbreak of a febrile illness among packing house workers in Brisbane, Australia, recognized that it represented a disease previously not described. He tentatively named it Q fever, the "Q" standing for query because at that time the questions surrounding its etiology were still unanswered.

In 1937, the organism responsible for this disease was found to be a Rickettsia[3] and given the name *Rickettsia burnetii*[3]. Also in 1935, in the United States, a filtrable agent was isolated by Davis and Cox[4] from the Rocky Mountain wood tick, *Dermacentor andersoni*, collected in the Nine Mile Creek area of Montana. This agent was identified as a Rickettsia and, unlike other members of this group, was found to pass through bacterial-tight filters; for this reason it was named *Rickettsia diaporica*[5]. Subsequently, the pathogenesis of this agent for man was revealed when accidental laboratory infection occurred[6] and the disease was referred to as nine mile fever. Dyer[7] suggested the similarity between nine mile fever and Q fever and the two were often referred to as American Q fever and Australian Q fever. Later, extensive immunological investigation[8,9] proved that the causative agent of nine mile fever and that of Q fever in Australia were the same.

Until 1944, the Rickettsia of Q fever was considered to be confined to Australia and the United States, with the naturally acquired disease appearing to be rare in America. Then in the eight-month period ending in June 1945, there occurred several outbreaks among the Allied troops stationed in Northern Italy, Greece, and Corsica[10]. Also, in the spring of 1945, an outbreak of Q fever occurred among United States troops returning from Southern Italy[11].

## Distribution of Q Fever is World-wide

Since 1945, evidence of this disease has been reported in Greece, Bulgaria, Rumania, Portugal, Spain, Belgium, Germany, Switzerland, Morocco, Algeria, India, Turkey, Iraq, and in Panama[12]. Further investigation may prove that the distribution of this organism is truly world-wide. The first case of naturally acquired Q fever in the United States was described by Hesdorffer and Duffalo[13] in Montana in 1941, although Cox,[14] on the basis of a serological survey, suggested that it might be much more widespread.

The first known, naturally occurring outbreak of Q fever in this country appeared explosively in Amarillo, Tex., in March 1946. In this outbreak, 55 of 136 employees of three packing houses were ill[15]. Later in the same year (August) another outbreak occurred in Chicago where 33 of 81 men on a killing floor in a packing house were affected[16]. These were the only known naturally occurring cases in the United States until May 1947 when the presence of the disease was uncovered in Southern California by Dr. Frank Young[17]. Shortly thereafter, it was found to be endemic in both southern and northern California[18,19,20,21].

The Rickettsia of Q fever resembles other organisms of the genus both morphologically and tinctorially, but differs from them in certain interesting ways. Thus, it is filtrable[4,6]; it produces no soluble antigen[22] and it does not stimulate the formation of agglutinins to the "X" strains of *Bacillus proteus*[8,14,3]; and in addition, the rash seen with other rickettsial diseases is absent in Q fever. For this reason, a new genera of Rickettsia to be known as *Coxiella* was proposed for this organism, the genotype to remain the same. This has been accepted and now appears in Bergey's Manual

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of Determinative Bacteriology[23] as *Coxiella burnetii*, Derrick.

The rickettsial etiology of Q fever stimulated inquiry into the roll of arthropods in the natural history of the malady. Experimentally, Philip[24] found that neither the mosquito, *Aedes aegypti*, nor the common house fly, *Musca domestica*, were able to transmit *C. burnetii* to normal guinea pigs, although the organisms could be recovered by inoculation of tissues from these species into guinea pigs. He was also able to show that the tick *D. andersoni* became infected during feeding experiments and remained so for as long as 127 days and that the feces from these remained infectious when stored for as long as 580 days.

The occurrence of naturally infected ticks has been reported from different parts of the world and includes: *Haemaphysalis humerosa* from Australia[25]; *Hyalomma savignyi* from Morocco[12]; and in the United States from *D. andersoni*,[26,4] *Rhipicephalus sanguineus*,[27] *Amblyomma americanum*,[28] and from the nymphal stages of the spinose eartick *Otobius megnini*[29]. However, epidemiological study and close clinical examination of patients suffering from this ailment in the United States have failed to indicate any arthropods or insects of importance in the transmission of Q fever from animals to man.

*C. burnetii* is found resident in nature in many other hosts besides arthropods and man. In Australia, it is postulated that the basic cycle of infection is maintained in ticks, bandicoots and cattle[30]. The human disease arising outside this basic cycle is an accidental infection. They further postulate that the human infection is acquired by inhalation of dried feces of infected ticks from hides of cattle. The air-borne route of infection could explain such outbreaks as that at Amarillo, Tex., and some of the laboratory outbreaks that have occurred in this country[31,32]. That the agent may be air-borne is shown by the work of Delay, Lennette and DeOme[33] who recovered the organism from the dust-laden air of premises harboring known infected dairy cows and sheep.

Evidence of infection with *C. burnetii* in cattle, sheep and goats has been reported from many different parts of the world including Australia,[25] Greece and Turkey,[34] and in the United States[18,19,35]. In addition, Huebner, *et al.*, in southern California recovered this organism from raw cows' milk[36] and from butter made from naturally infected and unpasteurized milk[37]. It is further reported by this group that three of 32 specimens taken from bottles of vat pasteurized market milk induced production of antibodies when injected into guinea pigs and that one of four specimens of vat pasteurized market cream did the same[38]. Extensive study of dairy cattle, dairy products, and dairy environments in southern California, conducted by the United States Public Health Service,[39] showed that at least 10% of many thousands of dairy cows in the Los Angeles milk-shed were or had been infected with *C. burnetii* and that 40 to 50% of all uninfected dairy cows coming into the area became infected within six months after arrival and many remained chronically infected for long periods. This group demonstrated further that the Q fever organisms were present in the milk of infected cows and could be demonstrated in the raw milk supply of the majority of the larger dairies tested in this area[39,40]. Pasteurization of this contaminated milk did not completely eliminate viable organisms[39].

In other investigations by this same group, it has been shown that the etiological agent of Q fever may be isolated from all four quarters of the udder and from the supramammary lymph nodes of infected cows[41] and further, that the placenta of infected cows could contain as many as 100 million infectious doses for guinea pigs per gram of tissue[40].

## California Studies

Two epidemiological studies by the group in southern California—the first, a study of 300 cases of Q fever and the second, an epidemiological and serological survey of specific population groups that were selected to represent various degrees of contact with dairy cattle and in which more than 12,000 persons were studied—showed that the greatest percentage of Q fever cases in the Los Angeles area occurred in people who used raw milk, lived near dairies or who had intimate contact with livestock or their raw products.

Q fever in northern California has been investigated by a team composed of personnel from the California State Department of Public Health, under the direction of Dr. Edwin H. Lennette and in cooperation with local health departments, and many practicing physicians in the state[20,21]. Lennette[42] has shown that the domestic livestock implicated in northern California were sheep and goats rather than cattle. In his investigation of sheep and cattle, with which Q fever patients had been associated, he found both possessed complement-fixing antibodies to *C. burnetii*. However, up to 86% of the sheep tested showed antibodies while less than 5% of the cattle were serologically positive[42].

Furthermore, a serological survey in this district of the general cattle and sheep population, that were not known to have association with human cases, revealed complement-fixing antibodies in only 3% of the cases. However, in one outbreak there was shown to be contact between the human cases and dairy cattle. Serological testing of these cattle revealed a high proportion possessed complement-fixing antibodies for the Rickettsia of Q fever and *C. burnetii* was isolated from the milk of some of these animals[41]. The studies of this group also showed that over two-thirds of 400 cases occurring in the last two years developed during the months of March, April and May, and that about ten times as many males were affected as females and most of these in the working age group of 20 to 49 years[41].

In the northern California study there was at least one group of cases in which there was no good evidence of direct contact with livestock and thus, while such contact may be an important factor in the transmission of Q fever to man, not all cases may be adequately explained on this basis. Lennette,[41] therefore, suggests that other possible sources and means of infection must be considered. One of these is the possible air-borne dissemination of the organism. This hypothesis gains strength from the fact mentioned before that *C. burnetii* has been recovered from the air in areas where known infected dairy cows and sheep and goats were kept[28,41].

The above presentation of known facts regarding the natural history of Q fever reveals that cattle, sheep and goats in contact with human cases of the disease show, in a high percentage of instances, previous or present experience with *C. burnetii* and that these animals probably represent the source of infection for man rather than the reverse. Although the mode or modes of transmission of this organism from animals to man have not been completely ascertained, several procedures suggest themselves for use in the control of Q fever. These include vaccination of man and animals, sanitary control of the environment surrounding the infected animals and pasteurization or elimination by other physicochemical means of *C. burnetii* from the products of infected animals with which human beings might come into contact.

Smadel, Snyder and Robbins[42] record that they were able to induce resistance to infection in guinea pigs with vaccines prepared from yolk sacs of infected embryonated eggs. The immunity induced was not absolute since many animals developed febrile espisodes of short duration following challenge with large doses of virulent organisms. They also found that all but two of 29 persons injected with their vaccine developed a specific complement-fixing antibody.

Meiklejohn and Lennette, in a preliminary report mentioned by Lennette,[41] have used a similar type vaccine on laboratory personnel constantly exposed to infection. He reports that in nearly 100 persons so vaccinated no cases of clinically evident Q fever have occurred and although it is difficult to evaluate a vaccine in laboratory personnel continually exposed to subclinical infection, it must be emphasized that Q fever is remarkable for its high morbidity amongst laboratory workers. A prolonged and extensive study of vaccination of dairy cows in southern California has been undertaken by members of the research team of the United States Public Health Service. Results so far have not been evaluated.

It has been shown that there is ample opportunity for the environment surrounding the animals to become contaminated in great numbers and because the organism has been isolated from dust-laden air collected on the premises housing infected animals, and furthermore, because some of the laboratory outbreaks in this country are best explained by the air-borne route of transmission, corrective sanitary measures would appear to be indicated. These would be difficult to carry out under field conditions when one considers that the postpartum placenta is heavily infected with organisms, and that the milk secreted by infected animals contains many Rickettsia. Often feces, urine, and nasal secretions are infective. Since there are no apparent symptoms in infected cows, sheep or goats and, as yet, no evidence of economic loss to the owner when his animals are infected, practical sanitary measures might be unattainable considering the husbandry of sheep, goats and cows. It would be equally difficult to identify and isolate or restrict the movements of infected animals to prevent effectively transmission of the infection to man and other animals.

### Influence of Pasteurization

Since the rickettsia is found in the milk of infected animals and is by that token a possible source of infection for man, it becomes necessary to investigate the effects of pasteurization and other methods of disinfection on this organism. It has been indicated previously[28] that pasteurization would probably diminish, but not completely eliminate *C. burnetii* from milk. It has been found that Q fever organisms would survive temperatures as high as 63 C.

(145 F.) when suspended in milk sealed in vials and submerged in water baths for 30 to 40 minutes, and that they were more resistant to the action of formalin and phenol than other Rickettsia such as *R. mooseri, R. rickettsi, R. akari*[44]. Intensive studies are under way to ascertain the thermo-resistance under controlled conditions and the effects of commercial pasteurization on this organism, both in an experimental commercial-scale pasteurization plant and by means of a field survey of the industry.

## Summary

Q fever is a specific rickettsial disease in man and the etiological agent, *C. burnetii*, produces inapparent infection in animals. Epidemiologically, infected cows, sheep and goats seem to be the important hosts involved as the source of infection for man. There is no evidence to date that involves arthropods in the transmission of the causative agent from animals to man. Evidence is presented strongly suggesting that human infection is acquired from animals or their products or by means of air-borne particles from contaminated environment. Assuming these are the primary ways in which man becomes infected, it is briefly considered what this means in control of the disease. It is also indicated that studies now in progress may produce more information along these lines.

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# Penicillin In Oil Retention Vehicles In The Treatment Of Streptococcic Mastitis*

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PENICILLIN has been established as the drug of choice by a number of investigators for the treatment of mastitis caused by *Streptococcus agalactiae*[1,2]. Although distilled water and physiological saline have served as penicillin vehicles, both permit rapid release of penicillin in the mammary gland over a relatively short time. This fact has prompted search for vehicles which would liberate therapeutic levels of penicillin over a considerable period.

Stults and Foley[1] ascribed the increased efficiency of penicillin in water-in-oil vehicles to the greater dispersion of the drug in the upper strata of the udder duct system and the gradual release of the antibiotic from the water-in-oil matrix. These two factors aid in the maintenance of therapeutic levels of the antibiotic even with periodic milking.

Spencer, *et al.*,[3] found that an emulsion of 10% of water in mineral oil was a more effective carrier of penicillin than an aqueous solution when used as a single dose in the intramammary treatment of chronic streptococcic mastitis. It was also demonstrated that three doses of penicillin in a mineral oil emulsion were far superior to three doses of a similar amount, 15,000 Oxford units of penicillin G, in an aqueous solution.

Seeberg and Street[3] considered the following factors to be important in the local treatment of bovine mastitis; the immediate rapid release of sufficient penicillin to give an effective initial penicillin concentration in the gland; slow release of the remaining penicillin during the ensuing 12-hour period; and cessation of penicillin diffusion at the end of this period. It would be desirable that the diffusion be complete at this 12-hour period in order to avoid milking out of unreleased penicillin.

Jackson and Bryan[4] obtained a measurable level of penicillin for 192 hours following infusion, during the middle of the lactation period, of 300,000 units of procaine penicillin in oil with aluminum monostearate.

Simon, *et al.*,[5] were able to demonstrate that a dose of 100,000 units of crystalline potassium penicillin G in 20 ml. of penicle,® repeated in 72 hours, had considerable therapeutic activity against mastitis caused by *Str. agalactiae*.

These reports cited stimulated efforts to determine the effect of different dosage levels of penicillin in a water-in-oil vehicle and in other experimental formulations, as well as of a limited trial to determine the persistency of penicillin in both oil retention vehicles and saline.

## Materials and Methods of Study

All the herds treated were on farms in the immediate area of Madison, Wis. These herds were maintained under average dairy farm conditions. Numerous cases of mastitis were evident. Each herd was treated by individual quarter sampling utilizing the Hotis test, by use of direct microscopic films, and by streaking each incubated sample upon a blood-agar medium containing 1:10,000 sodium azide and 0.5% mannitol. The infected quarters encountered were divided on a herd basis into two nearly equal and comparable groups so that each medicament could be employed under similar conditions. Following treatment, each infected quarter was sampled weekly for three consecutive weeks, utilizing the same procedures which were employed in determining original involvement. A quarter was considered free of streptococci upon being negative to all the consecutive post-treatment tests during the three-week period.

### Experiment 1. Influence of Different Dosage Schedules

*Group A.* 100,000 units of amorphorus penicillin,† sodium salt, in 10 ml. of penicle, repeated in 72 hours.

*Group B.* 25,000 units of amorphorus peni-

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†Supplied through the courtesy of Merck & Co., Rahway, N. J.

cillin, sodium salt, in 10 ml. of penicle, repeated in 72 hours.

The results of experiment 1 were as follows:

| Group | Number Quarters Treated | Quarters Freed of Infection Number | % |
|---|---|---|---|
| A | 51 | 34 | 66.7 |
| B | 58 | 35 | 60.3 |

Statistical evaluation of the results of therapy in experiment 1 indicated that 25,000 units of penicillin were as effective as 100,000 units in the experimental procedure utilized (Chi-squared equals 0.4669 and P equals 0.496).

### Experiment 2. Experiments with Various Penicillin Formulations

The methods used in this experiment were the same as in experiment 1 but the formulations were different. The experimental formulations contained either 100,000 units of crystalline penicillin or procaine penicillin G in 10 ml. of the material. These formulations varied in the components comprising the vehicle and hence, in viscosity and were employed in single treatments as follows: Dupont A—10 ml.; Dupont B—10 ml.; Dupont C—10 ml.; control—10 ml. of penicle containing 100,000 units of crystalline G penicillin, potassium salt.

The results of this experiment were as follows:

| Group | Number Quarters Treated | Quarters Freed of Infection Number | % |
|---|---|---|---|
| Dupont A | 69 | 51 | 74 |
| Dupont B | 66 | 44 | 66.7 |
| Dupont C | 61 | 40 | 65.6 |
| Control (penicle + penicillin) | 59 | 44 | 70 |

Statistical evaluation of this experiment did not indicate any significant difference in therapeutic efficiency among the several experimental formulations or the control group.

### Experiment 3. The Persistency in Normal Udders of Penicillin with Oil Retention Vehicles and Saline

Three normal lactating cows were infused with Dupont A, B, C, 100,000 units of crystalline G penicillin, potassium salt in 10 ml. of penicle and in 10 ml. of saline which is tabulated in the infusion schedule and results. A volume of 10 ml. of each respective formulation was used. Samples of the first milk and of mixed milk were obtained from each infused quarter at 12-hour intervals from the 12th through 120th hour following treatment. The samples were frozen at —20 C. and each was subjected to a tube dilution assay for penicillin content. The test organism was a strain of *Str. agalactiae* grown in brom cresol purple milk for 24 hours at 37 C. Each of the dilution tubes was seeded with 0.1 ml. of a 1:1,000 dilution of this culture.

The infusion schedule and results were as follows:

| | | Number Hours Over Which Inhibitory Level Persisted* |
|---|---|---|
| Cow No. 15 | | |
| Quarter | R.F.—10 ml. Dupont A | 96 |
| | R.R.—10 ml. Dupont B | 60 |
| | L.R.—10 ml. Dupont C | 60 |
| | L.F.—10 ml. penicle plus 100,000 units of crystalline G penicillin, potassium salt | 72 |
| Cow No. 16 | | |
| Quarter | R.F.—10 ml. Dupont B | 72 |
| | R.R.—10 ml. Dupont A | 96** |
| | L.R.—10 ml. saline plus 100,000 units of penicillin | 48 |
| | L.F.—10 ml. Dupont C | 72 |
| Cow No. 17 | | |
| Quarter | R.F.—10 ml. Dupont B | 36 |
| | R.R.—10 ml. Dupont C | 60 |
| | L.R.—10 ml. penicle plus 100,000 units of penicillin | 72 |
| | L.F.—10 ml. Dupont A | 96 |

The limited numbers of quarters in this experiment prevent attaching significance to the results. It appears, however, the Dupont formulation A may maintain an inhibitory concentration in the infused quarter for appreciably longer periods than the other preparations, namely, for at least 96 hours.

### Discussion

The results of therapy against *Str. agalactiae*, as ascertained by the methods utilized in this experiment, indicate that a dose of penicillin of

*Detectable quantity with dilution procedure assuming 0.03 units of penicillin per ml. to be inhibitory for *Str. agalactiae* as evidenced in the control tubes.

**Less than 0.03 unit of penicillin per ml. in mixed milk through 108 hr.; a trace of penicillin detected in foremilk at 120 hr.

25,000 units in 10 ml. of a water-in-oil vehicle, repeated at 72 hours is as effective as a total of 100,000 units administered in 10 ml. of water-in-oil vehicle and repeated at 72 hours.

The three experimental formulations, Dupont A, B and C, were as good as the controls, 10 ml. of penicle containing 100,000 units of penicillin for therapy against streptococcic mastitis.

As compared to other retention vehicles which we have used, Dupont A formulation permitted a longer persistence of penicillin in the mammary gland. However, the evidence gathered does not prove that the latter vehicle resulted in better therapeutic effects in streptococcic mastitis than did the other materials used in the experiment.

## Summary


1. An initial dose of 25,000 units of amorphorus penicillin in 10 ml. of penicle repeated at 72 hours was as effective for streptococcic mastitis as two doses of 100,000 units each in penicle.

2. Definite therapeutic activity against *Str. agalactiae* was demonstrated with penicillin in three experimental oil retention vehicles.

3. A therapeutic level of penicillin after its administration in Dupont A, was demonstrated 96 hours following infusion. This retention vehicle is as good as penicillin administered in the water-in-oil vehicle, penicle.


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Healthy bone for grafts may be kept for periods up to ten months at —7 F. (Hyatt). Successful use of bone grafts kept in ordinary quick freezers may be common practice in veterinary orthopedics in the near future. — *W. W. Armistead, D.V.M.*

## Dr. Chester F. Clark Named Dean at Michigan

Dr. Chester F. Clark has been named dean of the School of Veterinary Medicine by the Michigan State Board of Agriculture. The appointment was made to fill the vacancy left by the untimely death of Dr. Claude S. Bryan.

Doctor Clark was born in Fitchburg, Mass., the son of a general practitioner of veterinary

Dr. Chester F. Clark

medicine. Following graduation from the local high school, he enrolled at the then Massachusetts Agricultural College, now the University of Massachusetts, and later at the United States College of Veterinary Surgeons in Washington, D. C. He received his veterinary degree from Michigan State College in 1929.

Soon after graduation, Doctor Clark became a member of the staff of the Department of Animal Pathology at the Michigan School and was continuously employed there until his resignation in 1946 to accept the office of state veterinarian of Michigan. In September 1949, he rejoined the School of Veterinary Medicine, Michigan State College, as head of the Department of Surgery and Medicine, in which capacity he has served until this present appointment.

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## Change in Dates for C.D.C. Course

The Communicable Disease Center course in laboratory diagnosis of rabies will be given at the Virus Laboratory, Montgomery, Ala., September 24-28 instead of October 1-5 as announced earlier.

# On The Blood Picture Of Sheep Exposed To The Medium Stomach Worms. II. The Leukocytes†

A. C. TODD,* Ph.D., and Z. N. WYANT,* M.S., Lexington, Kentucky

THE data for this present paper were obtained during a series of continuing studies on the blood picture of lambs given single, controlled exposures to infective larvae of the two medium stomach worms, *Ostertagia circumcincta* and *O. trifurcata*. After each exposure of the lambs, the infections are permitted to follow their natural courses and are not interrupted by anthelmintic treatment. The device of using distinct and single exposures appears to yield a clearer insight into host reaction than can be obtained when animals are given multiple exposures in a restricted interval of time. The tests are conducted as a part of investigations on a subject which has come to be termed at this laboratory, "normal, subclinical parasitism in domestic animals."

The first paper of this series[1] detailed the patterns of host reaction to first infection by tracing the increases and decreases in numbers and sizes of red blood cells in three yearlings and three lambs. The present paper is concerned with tracing the number and identity of the white blood cells in circulation in three lambs after their first and second exposures to infective Ostertagia larvae.

## Materials and Methods

The three lambs used in these studies were animals which had been hand-reared on cow's milk. They were placed at birth in elevated pens with iron grate floorings. After weaning they were fed good quality alfalfa hay supplemented by a daily ¼ lb. of calf starter. They were fed and watered twice daily during the course of the experiments. The lambs were by a purebred Cheviot buck out of black-face native ewes.

Infective Ostertagia larvae, both *O. circumcincta* and *O. trifurcata*, were cultured in Baerman funnels according to a method developed by Cauthen[2]. Lambs were exposed to infection by means of a stomach tube.

A drop of blood from the bleeding needle is used to make smears for differential counts; the smears are stained with Wright's stain. The differential counts are based on 200 cells; in most instances the counts are obtained for each lamb in the study at succeeding 48 or 72-hour intervals. Holman[3] has presented the case for differential counts based on 200 cells. The white cells are separated into five groups only; neutrophils, eosinophils, basophils, lymphocytes, and monocytes. Oxalated blood is used for the duplicate total white cell counts which are done using Spencer bright-line hemocytometers. These latter duplicate counts are averaged and must be within 1,000 cells/cmm. of each other.

## Observational Data

Two of the three lambs, 2 and 1, respectively, were exposed to 6,400 and 300 larvae when less than one month of age. The third lamb, 4, received its first exposure at five months of age and was given 6,400 larvae. The series of total white cell counts, together with the absolute counts of neutrophils, eosinophils, lymphocytes, and monocytes, for each lamb are shown in fig. 1, 2, and 3.

The responses of the two lambs exposed to 6,400 larvae were quite similar, from a standpoint of total white cell count. Each lamb showed an apparent progressive, but not continuous, decrease in total count. (Fig. 1 and 3.) At 55 days after exposure lamb 2 had a total count of 4,100 white cells, a decline from 5,750 at one day after exposure. Lamb 4 had a count of 3,500 white cells at 55 days after exposure, a decline from 5,900 at one day after exposure. The lowest total white cell counts were recorded at 33 and 23 days after exposure, respectively, and were 3,150 and 3,350, respectively. The red cell count for lamb 2 at 33 days after exposure was 3,780,000, while the red count of lamb 4 was 7,490,000 at 23 days after exposure. The lower white cell counts persisted, however, after the red cell counts had initiated a return or had returned to figures near normal by 55 days after exposure, as shown in the first paper of

†The investigation reported in this paper is in connection with a project of the Kentucky Agricultural Experiment Station and is published by permission of the Director.

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this series[2]. The response of lamb 3, exposed to 300 Ostertagia larvae, was not pronounced. Its total white cell counts (fig. 2) principally indicated day to day variation. For example, following first exposure this lamb's red cell count declined to 7,220,000 at the end of 13 days and at this point its white cell count had increased to 6,000 from an initial count of 4,950 two days after exposure. On the other hand, its lowest white cell count at 48 days after exposure, 3,250, accompanied its highest red cell count, 11,980,000.

The absolute counts of neutrophils were not in agreement in the three lambs following their first exposures. Counts in lamb 2 formed an apparent, progressive, but not continuous, decline. At 55 days after exposure, neutrophils in this lamb numbered 369/cmm., a decline from 2,041/cmm. at one day after exposure. This lamb probably could be considered to have shown a neutrophilic leukopenia at 55 days after exposure. Lamb 4 had a lower initial neutrophil count, 885/cmm. at one day after exposure, and its counts showed only moderate daily variation unless its counts of 518, 832, and 419/cmm. at 19, 21, and 23 days after exposure may be considered abnormal. Lamb 1, exposed to 300 larvae, showed a slight, progressive increase in neutrophil counts following its infection.

The absolute counts of lymphocytes were most closely related to total white cell counts in each of the lambs. The pictures in lambs 1 and 2 were most similar; each exhibited a slow, progressive decline, most evident after three weeks' infection. By 55 days after exposure each lamb showed rising counts, initiated earlier, however, in lamb 1, exposed to only 300 larvae. The drop in total white cell count in lamb 4 at 21-31 days after infection appears derived almost entirely from its reduced lymphocyte count. A regression of its total white cell count also showed a slight downward trend.

Only lamb 2, which was exposed to 6,400 larvae and was most severely affected by its infection, showed a definite eosinophilia. The eosinophilia was evident at 21 days after exposure, but apparent increased numbers of eosinophils were counted throughout the period after exposure and before maturity of the infection. Thereafter, numbers of eosinophils

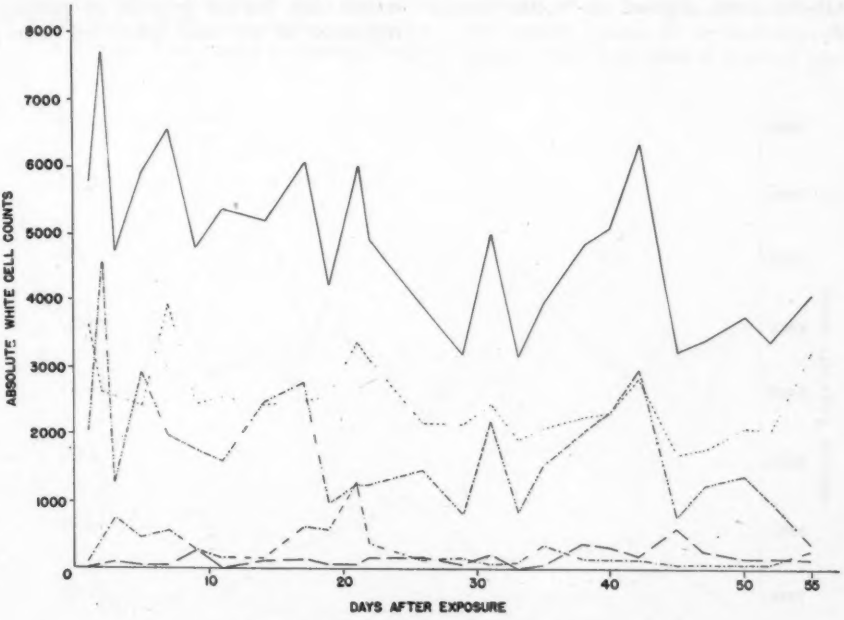


Fig. 1. Lamb 2, first exposure, 6,400 larvae.

——————— total white cell count
. . . . . absolute lymphocyte count
—..—..— absolute neutrophil count
—.—.—.— absolute eosinophil count
——— ——— absolute monocyte count

declined markedly. (Fig. 1.) At 21 days after exposure the absolute count of eosinophils was 1,260, which exceeded the neutrophil count. The five-month-old lamb, 4, showed no striking increase or decrease in numbers of eosinophils. The month-old lamb, 1, exposed to 300 larvae, showed a gradual increase in eosinophil numbers, reaching its highest level at 55 days after exposure, 748/cmm. By 58 days after exposure the eosinophil count dropped to 87/cmm.; in the next 42 days, that is from 58 days up to 100 days after exposure, this lamb's eosinophil count never exceeded 300/cmm.

The absolute basophil counts for the three lambs are not recorded in this paper. These cells showed no apparent response after the exposures. The monocyte counts recorded for lamb 1 showed no apparent response to infection, but were almost consistently exceeded by the eosinophils. In the early part of the infection, monocytes of lamb 2, exposed to 6,400 larvae, were exceeded in number by the eosinophils; in the latter part of the infection there appeared a moderate increase of absolute monocyte numbers. The monocyte counts in lamb 4 were roughly similar to those in the month-old lamb exposed to 6,400 larvae, lamb 2.

Each lamb received 6,400 larvae for its second exposure. An interval of 200 days occurred between the first and second exposures of lamb 1. The time interval for lamb 2 was 107 days; the interval for lamb 4 was 56 days. Lambs 1 and 2 were exposed to 300 and 6,400 larvae in their first exposures when less than a month of age. Lamb 4 received 6,400 larvae in its first exposure at five months of age.

Following their second exposures, lambs 2 and 4 showed apparent progressive, but not continuous, increases in total white cell counts. (Fig. 4 and 6.) At 50 days after exposure lamb 2 had a total white count of 5,500, an increase from 4,750 at one day after exposure. Only three counts, however, were less than 4,750 and at 40 days after exposure the total white count for lamb 2 was 8,600. At 52 days after exposure, lamb 4 had a total white cell count of 7,450, an increase from 3,750 at three days after exposure. None of the counts after exposure were less than the 3,750 recorded at the beginning of the second test. Total white counts recorded for lamb 1 did not show an obvious increase; the overall picture showed a slight decrease, (fig. 5), which was demonstrated also, but not graphed, by plotting the regression of the total white cell counts on

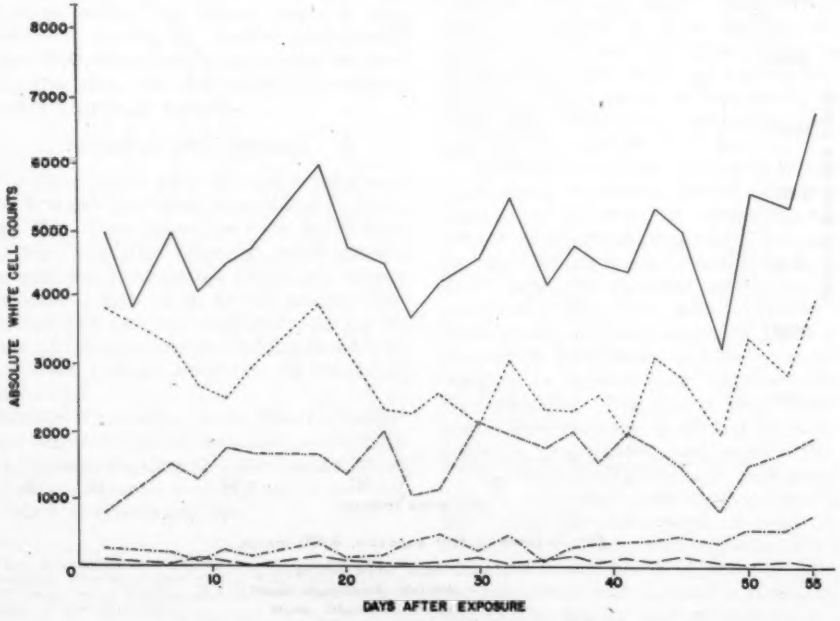


Fig. 2. Lamb 1, first exposure, 300 larvae. (See legend under fig. 1.)

the elapsed time after exposure when observations were made.

The absolute neutrophil counts of each lamb increased moderately following second exposure. None of the increases indicate a neutrophilic leukocytosis. The overall increase for lamb 2 appears largely derived, however, from absolute counts of 1,560, 2,107, 2,128 and 1,270 neutrophils at 38, 40, 43, and 46 days after exposure.

Absolute lymphocyte counts following second exposure of lambs 2 and 4 were opposite to the findings for these lambs following their first exposure. The lymphocytes in these animals showed obvious increases in numbers as the infections proceed. Numbers of lymphocytes in circulation in lamb 1 were found to decrease after second exposure. The decrease of lymphocytes resembles the situation in lambs 2 and 4 following their first exposures. In each lamb absolute lymphocyte numbers appeared more closely related to total white cell counts than any other type of cell.

None of the three lambs showed a clear-cut eosinophilia following their second exposures. Lamb 2 again had increased numbers of eosinophils in the first part of its infection, including a high of 800/cmm. at 11 days after exposure, and thereafter the numbers of eosinophils decreased. The picture in lambs 1 and 4 was an overall increase, most pronounced after maturity of the parasites and after red cell counts had initiated a return, or had returned, to normal.

Numbers of basophils recorded after the second exposure again showed no relation to the infections sustained by the three lambs. Numbers of monocytes recorded for lamb 2 again were exceeded by eosinophils in the early part of the second infection, but showed an increase in the later part of the infection. Monocytes in lamb 1 reached a peak of 995/cmm. at nine days after exposure but thereafter declined; generally, they exceeded the numbers of eosinophils. Most numerous monocytes occurred in lamb 4 at 38 days after its second exposure.

## Discussion

These present data have been collected in order to obtain information about the blood picture of sheep which have sustained subclinical infection with medium stomach worms. Blood pictures of animals given controlled infections are useful in understanding the blood pictures of sheep with normal, subclinical parasitic infections.

None of the three lambs had total white cell counts before or immediately after exposure which approached numbers previously

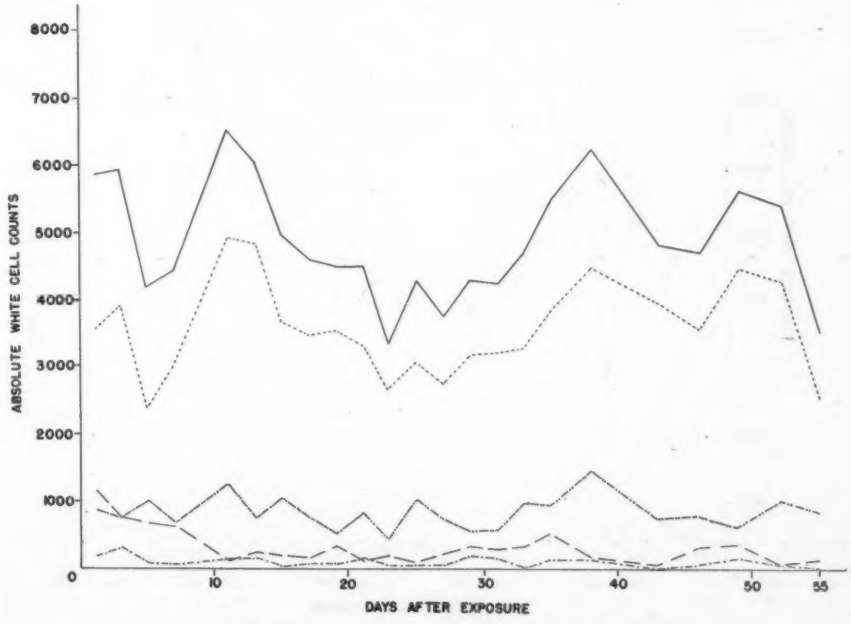


Fig. 3. Lamb 4, first exposure, 6,400 larvae. (See legend under fig. 1.)

reported for other healthy sheep. Holman[3] recorded an average of 9,200 leukocytes/cmm. for 171 Scottish hill sheep, "Cheviots and Blackfaces—and their crosses with the border Leicester breed — half-breds and grey faces, respectively." He cited a report of 8,000 leukocytes/cmm. for ten sheep given by A. C. Fraser. Fourie[4] recorded an average of 8,400 leukocytes/cmm. before first exposure of 11 lambs and young sheep in his study of haemonchosis in sheep in South Africa. The two, month-old lambs used in this study had total white cell counts of 5,750 and 4,950/cmm. at exposure; the five-month-old lamb had 5,900/cmm. at exposure. These counts are considered "normal" at this laboratory; the animals were reared indoors in raised pens. Their diet was carefully regulated, particularly in order to help prevent development of enterotoxemia.

Ross and Gordon[5] reported a slight increase in white cells in sheep with natural Ostertagia infections. Threlkeld and Downing[6] have shown a leukocytosis associated with heavy exposures, 225,000 and 1,146,000, of Ostertagia larvae in two lambs less than a month old at first exposure. Their exposures were given in series. Delaune and Mayhew[7] reported increases of leukocytes associated with anemias in their studies of calves exposed to nodular worms and hookworms; Mayhew detailed the series of inoculations in the study[8]. Lambs 2 and 4 developed anemias following first exposures but not increases in white cells. Their total white cell counts, while not indicative of leukopenias, showed decreases. Following second exposures, these two lambs showed increases in white cells but no counts approached levels which indicated leukocytosis. In an approximate 2½ month period after exposure to 1,146,000 larvae, Threlkeld and Downing found a high total white cell count of 15,450 in a lamb first exposed at three weeks of age.

The drop in lymphocytes in lambs 2 and 4 following first exposure to 6,400 larvae was also recorded by Threlkeld and Downing[6] in two of their lambs following exposure to 225,000 and 1,146,000 larvae. After second exposures our two lambs showed increased numbers of lymphocytes. Fourie[4] recorded a neutrophil leukocytosis toward the end of fatal haemonchosis in sheep. Each of our three lambs

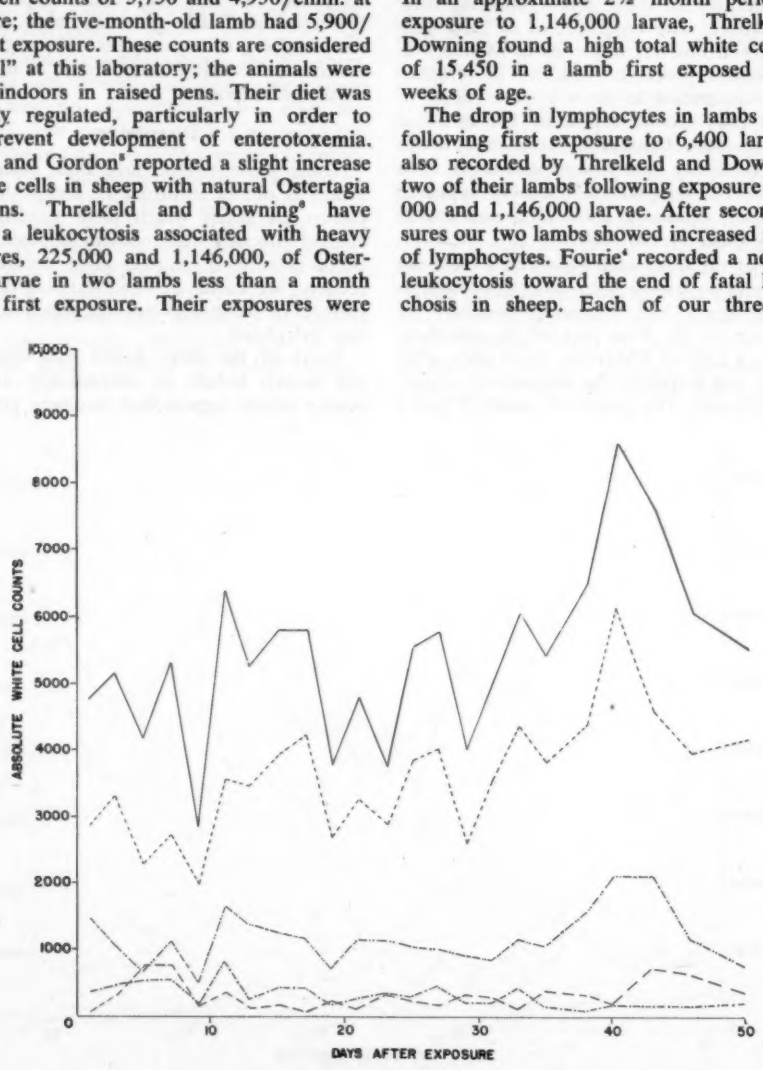


Fig. 4. Lamb 2, second exposure, 6,400 larvae. (See legend under fig. 1.)

showed moderately increased numbers of neutrophils, following second exposures, but none approached a neutrophil leukocytosis. Actually lamb 2 showed more of a neutrophil leukopenia following its first exposure. (Fig. 1.) Delaune and Mayhew[7] found lymphocyte decreases associated with a rise of stab neutrophils in their studies. In the two studies reported here immature neutrophils consistently remained below 1%. In severe cases of haemonchosis Fourie[4] graphed neutrophil absolute counts which exceed absolute lymphocyte counts after a series of exposures to Haemonchus. Neutrophils in our lamb 2 exceeded numbers of lymphocytes on the second, fifth, fourteenth, seventeenth, and forty-second day after first exposure. This reversal of neutrophil and lymphocyte numbers did not occur in lamb 2 following second exposure, nor in lambs 1 and 4 in either exposure. Stewart and Holman[8] recorded 52% neutrophils and 43% lymphocytes in a group of 17, six-month-old lambs which had sustained natural parasitic infections. At the same time the latter authors recorded 34% neutrophils and 55% lymphocytes in ten healthy lambs at the same Scottish farm.

Eosinophilia was not a characteristic of our experimental lambs which sustained moderate, subclinical infections. At 21 days after exposure lamb 2 had 21% eosinophils, an absolute count of 1,260; this was the highest count obtained and occurred in the lamb most severely affected by 6,400 Ostertagia larvae. Delaune and Mayhew[7] did not record a consistent and high-grade eosinophilia in their cattle given controlled exposures to nodular worms or hookworms. Stewart and Holman[8] found their 17 parasitized lambs had a mean eosinophil count of 0.7%, in contrast to 3% in the ten healthy lambs. Neutrophilic leukocytosis appears to have been more characteristic of Fourie's studies on haemonchosis in sheep than was an eosinophilia[4].

## Summary

A study has been made of total leukocyte and differential white cell values in three lambs each given two separate, controlled exposures to infective larvae of *Ostertagia circumcincta* and *O. trifurcata*. The exposures resulted, with

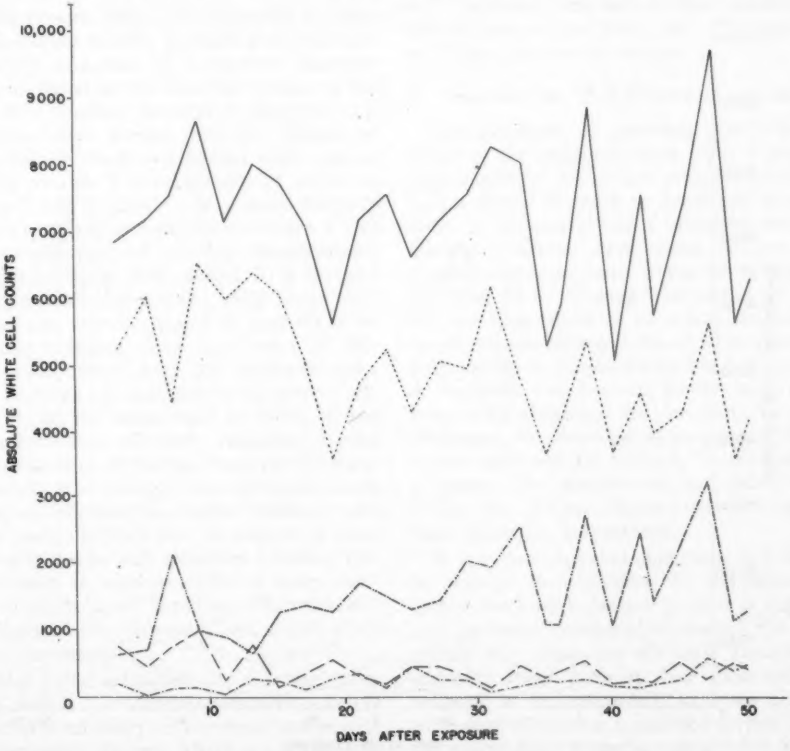


Fig. 5. Lamb 1, second exposure, 6,400 larvae. (See legend under fig. 1.)

one partial exception, in subclinical infections only.

Following first exposures, in two lambs given 6,400 larvae at exposure, and in the 55-day period after exposure, the total white cell counts of these lambs showed progressive, but not constant, decreases in numbers of cells/cmm. The decrease in each case was arrested, and recovered somewhat, in the time area near sexual maturity of the parasites, but later resumed. Absolute numbers of lymphocytes also decreased in a similar manner but no marked recovery occurred in the younger lamb, which was more severely affected. The latter lamb approached a neutrophilic leukopenia near the end of the first period of study. A moderate eosinophilia occurred only in this same lamb.

Following second exposure, total white cell counts and absolute counts of lymphocytes and neutrophils showed moderate progressive increases, but not leukocytosis.

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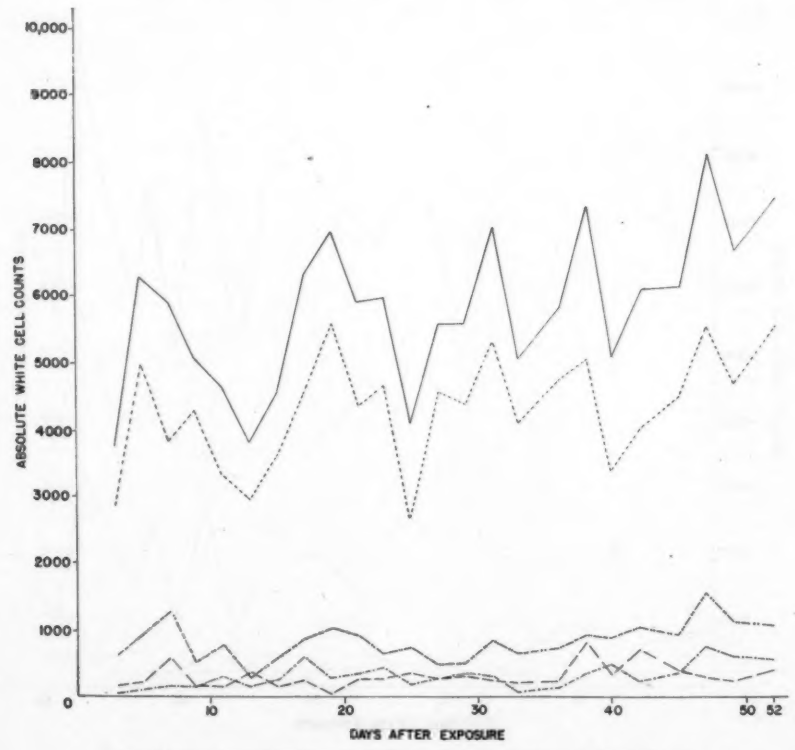


Fig. 6. Lamb 4, second exposure, 6,400 larvae. (See legend under fig. 1.)

# The Use Of Estradiol Cyclopentylate In The Treatment Of Anestrum In Cattle

W. J. GIBBONS, D.V.M., M.S., Auburn, Alabama

THE establishment of disease control programs constitutes the most valuable service that the veterinarian can render the dairyman. Such service is most profitable for the practitioner.

The important veterinary and animal husbandry problems involving dairy herds in the United States are breeding problems, raising calves, control of mastitis and brucellosis. Monthly examinations of dairy cattle in relation to pregnancy diagnosis and sterility can accomplish much in solving breeding troubles. Periodic examinations will mean added months of milk production and added offspring to the yearly herd totals.

At the present time, it is impossible to diagnose functional sterility in cattle due to absent or delayed ovulation or to factors involving the implantation of the fertilized ovum in the uterus. It is possible, however, to diagnose and treat functional sterility due to failure of estrum and an abnormal estrous cycle caused by cystic ovaries. The occurrence of anestrum in many herds of dairy cattle is more frequent than veterinarians and dairymen realize. Cows judged in anestrum fall into two classifications; (a) those failing to show estrum 70 to 90 days after normal calving, and (b) those found nonpregnant and with no record of heat 60 to 90 days after breeding. In a dairy herd of 100, during 1949, there were 26 anestrous cows which required 40 treatments to correct the condition. In the same herd in 1950, it was necessary to treat 37 cows, requiring a total of 41 treatments. In another herd of 150 milking animals, four to eight were found on every monthly examination to require treatment. Although anestrum may not be present to such a degree in herds with excellent breeding records, it exists to such an extent in many dairy herds it might upset breeding efficiency and cause considerable economic loss, if not given proper consideration.

Careful rectal palpation of anestrous cows usually reveals a retained corpus luteum firmly embedded in an ovary or an atonic uterus with non-functioning ovaries. There are a few animals, apparently nonestrum, that disclose on rectal palpation, a uterus with good tone and a normal corpus luteum in one ovary. These are not classified in the anestrum group but are judged to be those which have so-called silent heats, or where heat periods have been missed by the dairyman. There is an accepted opinion among most veterinarians that in anestrum, a corpus luteum may be found in the ovary in the majority of cows. This opinion, if true, would tend to solve the problem of heat failures to a great extent. Unfortunately it is not usually true in dairy herds. In a recent series of 213 anestrous animals, the writer found 67 cows with a corpus luteum present, four with a cystic corpus luteum, one with pyometra, one with chronic metritis, one case of mummified fetus, and 139 apparently with non-functioning ovaries.

### Importance of Accurate Diagnosis

The treatment of anestrum should be governed by the diagnosis made after a thorough examination of the genital organs. Careful palpation should be made to determine the possibility of pregnancy from unknown breeding. During a monthly herd check, six cows supposedly anestrous were found to be pregnant for from 35 to 45 days. The source of breeding was ascertained to be a bull, believed too small and too young to breed adult cows. The bull has since demonstrated his high fertility. A valuable two-year-old heifer was treated twice with stilbestrol for anestrum by a veterinarian. A consultation requested by the owner disclosed the heifer to be four months' pregnant. The veterinarian had failed to examine the genital organs before treatment. Such failure is inexcusable.

If the cow, upon examination, is judged to be normal but classified in the silent heat group, the corpus luteum present is expressed and the owner cautioned to observe the animal closely for symptoms of heat. Usually trial breeding from three to five days following removal is recommended. In cows classified as nonestrous due to a retained corpus luteum, the yellow body is always expressed if possible. Inability to express the corpus luteum from

the ovary is rare. In all cases of anestrum that are treated, the herdsman is given a list of the treated cows and advised to observe them closely.

All those with non-functioning ovaries are treated with an estrogenic substance to initiate an estrous cycle. In past years, numerous estrogenic substances have been used to induce estrum in cattle. These substances include whole ovarian extract, ovarian residue, follicular fluid (estrual hormone) and aqueous extract of the anteropituitary. None of these preparations could be considered an efficient treatment when compared with the results obtained by expressing the corpus luteum. The arrival of stilbestrol on the market appeared temporarily to solve the problem. But again, when results of the injection of stilbestrol are compared with the positive heat periods occurring following the removal of the corpus luteum, the efficiency of the drug is disappointing and repeated dosage may have some disadvantages by the production of cystic ovaries and disturbed milk production.

## Hormone Therapy

During the past three years, more efficient estrogenic substances have become available. Estradiol compounds such as alpha estradiol, estradiol beta, estradiol beta (17), estradiol benzoate, dienestrol, etc., are capable of producing efficient and prolonged symptoms of estrum. Of ten estradiol compounds tested on spayed rats, the most favorable results were obtained with estradiol, 17-(beta-cyclopentylproprionate) now named estradiol cyclopentylate®. The ideal estrogen for cattle practice would be one which could be administered as a single treatment, produce estrum before the next monthly visit, and initiate normal heat cycles. Estradiol cyclopentylate was selected for use on cows failing to come into heat. The drug, dissolved in oil, is available in 10 cc. vials (1 mg. per cc.). Two and three milligram doses were used on a few cows with disappointing results. When increased to 10 mg., excellent results were obtained. However, three cows so treated continued in heat for three to four days and the estrous cycle was repeated in seven days. The dose was lowered to 5 mg. with successful production of estrum and without abnormal cycles.

Of 80 cows treated, the period of failure of estrum was from 31 to 222 days. The average period of heat failure was 90.3 days.

**TABLE 1. Summary—Treatment of Anestrum**

| Treatment | No. cows treated | Estrum produced 1-15 days | 15-30 days | Total | % | No. breedings | Conceptions 1-15 days | 15-30 days | Total | % |
|---|---|---|---|---|---|---|---|---|---|---|
| Corpus luteum expressed | 57 | 37 | 10 | 47 | 87.0 | 37 | 16 | 5 | 21 | 56.7 |
| Stilbestrol (20 mg.) | 34 | 12 | 8 | 20 | 58.8 | 19 | 2 | 3 | 5 | 31.1 |
| Estradiol cyclopentylate (5 or 10 mg.) | 80 | 61 | 14 | 75 | 93.8 | 45 | 12 | 4 | 16 | 37.7 |

In order to make comparisons, a series of cows were treated with 20 mg. of stilbestrol. Both results were compared to a group in which the production of estrum was attempted by expressing the corpus luteum. Breeding cows after the injection of the estrogens was not advocated but many were bred intentionally or unintentionally. The conception rates were compared with those of animals bred following the removal of the corpus luteum. The comparative results are listed in the accompanying table. All heat periods occurring within 30 days following the injection of the estrogens were counted as positive. Conceptions counted as positive were only those which occurred at the time of the first estrum after treatment.

As shown in table 1, 93.8% of cows treated with estradiol cyclopentylate came in heat within 30 days as compared with 87% when the corpus luteum was expressed and 58.8% when 20 mg. of stilbestrol were injected intramuscularly. In a high percentage, 76.2%, treated with estradiol cyclopentylate, estrum occurred within the first 15 days. One-half of the animals treated came in heat within the first five days. Eight showed estrum on the first day following treatment, 13 the second day, nine the third day, and five on the fourth and fifth days.

Five cows, supposedly anestrum, were injected with estradiol cyclopentylate with negative results. Uterine examination 30 days later disclosed pregnancies of an estimated 45 to 55 days' duration. No corpora lutea could be pal-

®Estradiol cyclopentylate is a registered trademark of The Upjohn Company, Kalamazoo, Mich. This new veterinary product will be offered as E.C.P., which will be available for general sale to the profession in the near future.

pated on the first examination. Estrum or disturbance of pregnancy did not occur.

## Summary

1. Failure of estrum occurs frequently in cattle, and causes considerable economic loss.

2. In the majority of a series of 213 cows, lack of an estrous cycle was due to failure of ovarian function, rather than to retention of the corpus luteum.

3. Estradiol cyclopentylate induced estrum in 75 of 80 cows with non-functioning ovaries. Subsequent normal heat cycles appeared in all but one of the cows treated and not conceiving. The five cows not responding to the injection of the estrogen came into estrum after a second injection.

4. Estradiol cyclopentylate compares favorably with the removal of the corpus luteum in percentage of estrous cycles induced and the production of estrum within 15 days following treatment.

5. In the estrum induced by the removal of the corpus luteum, ovulation takes place. The results obtained indicated that ovulation may take place in a fair percentage in which heat was induced by estradiol cyclopentylate. As near as could be determined by rectal palpation, twin pregnancy has not occurred from the conceptions resulting subsequent to the injection of this estrogen. Six pregnancies which were produced by breeding on the heat cycle induced by estradiol cyclopentylate have terminated. All were single births and five of the six were heifer calves.

## Conclusion

Estradiol cyclopentylate in a dosage of 5 mg. appears to be a practical and successful estrogenic substance for the production of estrum in cattle.

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Spermatozoa in undiluted semen obtained from the epididymis of a bull were kept alive at 0 to —4 C. for 20 to 21 days under anaerobic conditions.—*Arcadio C. Gonzoga in Phil. Jour. An. Ind.*, 10:47, 1949.

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Romanelli, of Italy, reports that in eight cattle experimentally infected with the foot-and-mouth disease virus, he found an increase of 300% in the histamine content of the blood and an increase of 240% in the liver as compared with the histamine content of these organs in healthy cattle.

## The Role of Animals in Q Fever

(*Continued from page* 386)

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# PUBLIC HEALTH

JAMES H. STEELE, D.V.M., M.P.H.
Atlanta, Georgia

## Brucellosis

Dr. M. Ruiz Castaneda of Mexico City in the Annual Review of Microbiology, 1950, writes on brucellosis. In his section on control and eradication, the author states; "In spite of the complex epidemiological aspects of brucellosis the most important channels of infection are ingestion of contaminated food and direct contact with infected animals. Enforcement of pasteurization of all dairy products and increased propaganda in rural zones has been effective in the United States, Canada, and Northern Europe. The same recommendations have failed in Mexico, South America, and Mediterranean countries. A possible reason for this difference is that in the latter countries goats are the most important reservoir of the disease. It is obvious that under such conditions, proper sanitary measures are exceedingly difficult of application. Furthermore, goats infect dairy cattle thus increasing the sources of melitensis infection. The incidence of brucellosis by direct contact has increased everywhere, particularly because of cross-infection of animals with virulent organisms. Because of the importance of this epidemiological aspect of the infection, several attempts have been made to consider brucellosis as an occupational disease."

Reference to the cross infections between goats and dairy cattle in Latin and Mediterranean countries is a reminder of how a sizable goat industry can complicate brucellosis problems. With the growth of goat dairy herds in all parts of the United States, this could become a very serious problem if introduced into herds supplying fluid milk to metropolitan areas. It would not only be important to public health but the indications are that it would be serious as an animal disease.

Castaneda goes on to point out that he fears that certain brucellosis will remain an unsolved problem in many countries where economic and educational conditions are the main obstacles to the eradication of the disease. What he says about those countries is probably true of parts of the United States where bovine and porcine brucellosis control programs have not been successful. It is very important to educate residents of communities to the necessity of the eradication of disease. They must be well indoctrinated in the necessity of brucellosis eradication; not only for their animal health but for protection of their personal health as well. The position of the veterinary practitioner is one of importance for spreading this doctrine. In educating his clients, he is not only serving the animal health interests but public health as well.

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Studies on the cause of enteric diseases in dogs and cats are being pursued in many parts of the country since the Michigan Health Department reported on the high prevalence of Salmonella infections in dogs. Gorham and Garner (*Am. Jour. Vet. Res.*, 12:35 [Jan.], 1951) report on the incidence of Salmonella infections in dogs and cats in southeast Washington. About 1% of the dogs were infected. This is much lower than any other part of the country where similar studies have been made.

The authors point out that new modifications of the tetrathionate brilliant green bile broth by the addition of sulfathiazone, as reported by Galton, Stucker, McElreath and Hardy, have increased isolation by 38% and this technic probably would have increased their isolations if it had been available at the time of the study. The discovery by Galton, *et al.*, that sulfathiazole reduces the high concentration of Proteus organisms in dog stools will aid all investigators immeasurably in isolating this organism from dog feces. The reporting of paracolon and pseudomonas organisms by Gorham and Garner in seriously ill dogs is of interest to veterinary medicine and public health. Some veterinary and public health laboratories are now doing Salmonella examinations of dog and cat stools and in the future we may see more of these tests being run for veterinary clinicians.

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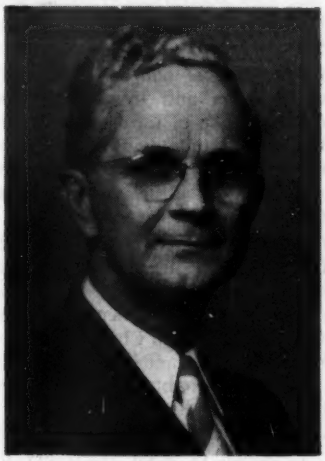
## Botulism

One case of botulism diagnosed April 2, three days after the patient tasted home-canned string beans that appeared spoiled and were musty in odor, is reported by Dr. W. L. Halverson, California Director of Public Health. The patient is expected to recover. After one bean was eaten, the remainder of the jar was thrown to chickens and ducks. Twenty to 30 of the fowl died of typical limberneck.

# A. V. M. A. Milwaukee Meeting Sets New Records

Since 1863, or for 88 years, the American Veterinary Medical Association has been holding annual meetings. Exceptions were in 1874, when the meeting was not held owing to error in date of notices, and in 1914 because of war. In 1943, the convention was shortened from that originally planned, and in 1945 only a



Dr. John R. Wells

business meeting of the Executive Board and House of Representatives was held; also because of wartime restrictions on travel. Some of the earliest conventions met for only one day.

These meetings have grown so that this year more than 1,600 veterinarians attended sessions, which means that with veterinarians, visitors, exhibitors, and guests, 3,128 persons were present. A new record was set last month in Milwaukee with an attendance exceeding by 902 the best previous attendance registered in Cincinnati in 1947.

## Officers Named

Dr. John R. Wells, practitioner at Palm Beach, Fla., was installed as president to serve the Association for the coming year. He succeeds Dr. W. M. Coffee, LaCenter, Ky.

Dr. William L. Boyd, director of the School of Veterinary Medicine, University of Minnesota, St. Paul, was unanimously elected president-elect. He will succeed Doctor Wells as president in 1952.

Following his graduation from the Kansas City Veterinary College in 1909, Doctor Boyd joined the staff of that institution as an instructor. In 1911, he resigned and accepted a position in the Division of Veterinary Medicine of the University of Minnesota. He was promoted to assistant professor within a comparatively short time and in 1918, to full professorship. His early duties at Minnesota consisted of teaching agricultural students and assisting in the research programs of the school.

Doctor Boyd also made disease investigations for the Minnesota State Livestock Sanitary Board and the Agricultural Extension Division. He became interested in brucellosis soon after arriving at Minnesota and has

Dr. W. L. Boyd

worked on this subject continuously since that time. His interest in clinical medicine and his work in the field of infertility of cattle are best known.

At present, Doctor Boyd is president of the Minnesota State Livestock Sanitary Board, president of the Association of Animal Disease Research Workers of North America and chairman of the University of Minnesota Senate Committee on Intercollegiate Athletics. He was appointed chief of the Division of Veterinary Medicine in 1940 and in 1947 director of the new School of Veterinary Medicine. With the opening of the college year 1951-52, Doctor Boyd will have served Minnesota University continuously for 40 years.

(L. to R.) Dr. Thomas J. Jones, dean, School of Veterinary Medicine, University of Georgia, Athens; Dr. R. D. Turk, veterinary parasitologist, Texas A. & M. College, College Station; and Dr. I. B. Boughton, dean, School of Veterinary Medicine, Texas A. & M. College, College Station.

(L. to R.) Dr. W. L. Boyd, St. Paul, Minn., and Dr. J. D. Ray, Omaha, Neb.

(L. to R.) Dr. E. J. Frick and Dr. F. H. Oberst, both of Manhattan, Kans., visit VETERINARY MEDICINE's display booth.

Other officers elected and installed at the Milwaukee meeting include: Dr. E. A. Grist, New Braunfels, Tex., 1st vice-president; Dr. C. C. Rife, Atlanta, Ga., 2nd vice-president; Dr. I. S. McAdory, Auburn, Ala., 3rd vice-president; Dr. A. D. Glover, Canton, Mo., 4th vice-president, and Dr. L. C. Swan, St. Catherines, Ontario, Canada, 5th vice-president. Dr. W. A. Young, Chicago, was re-elected treasurer. Dr. J. G. Hardenbergh will continue in his present capacity as executive secretary and Dr. C. D. Van Houweling as assistant executive secretary.

## The President's Address

In his presidential address, Doctor Coffee reviewed progress and trends in veterinary medicine and spoke of the varied responsibilities assigned to groups within the profession. Demands for specialized services make imperative correlating the efforts of all through a representative national organization.

In discussing public and professional relations, Doctor Coffee urged that all subsidiary organizations, including state groups, take advantage of the services of departments set up in the A.V.M.A. office in Chicago and manned by personnel trained and experienced in this work. He left no doubt of the importance of the effort and the value to be gained by keeping allied professional groups, as well as Mr. Citizen, informed of what veterinary professional services mean to every individual. Effectively correlated with national public relations work, efforts of smaller groups may be made of increased value at less expense.

Concrete benefits of membership in the A.V.M.A. were listed and all were urged to associate themselves with the national organization and to become interested in professional projects and activities at the national level.

## Veterinarians in the National Defense Program

The veterinarian's role in military and civil defense was outlined by Dr. W. R. Krill, dean, College of Veterinary Medicine, Ohio State University, Columbus, who has served during the past year as chairman of the A.V.M.A. Emergency Advisory Committee. Doctor Krill's work with nationally prominent persons concerned with defense planning was complimented by President Coffee in his address.

In consideration of the international situation, every American must face the grim possibility of enemy action. Long range aircraft

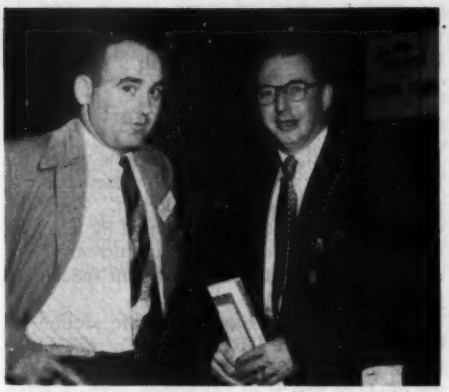
make possible war at our doorstep by weapons for which defense is inadequate. Preparedness by planning action should war be unleashed on this country is essential for national survival. The veterinarian would be called on to perform at least three vital services in the event of war. First of all, his greatest role would be to continue to guard the health of our food-producing animals to assure supplies of healthful meat foods. The task might conceivably be complicated if biological warfare were used and plagues not now present in the United States were introduced as a submission weapon. Second responsibility, correlated with the first, is the assistance veterinarians might render in public health matters. The third general service would be the assistance given to physicians in first aid to injured if our metropolitan centers are bombed.

These services pointed out by Dean Krill are in addition to the responsibility of providing personnel to meet the needs of the armed services and those of the livestock industry, and at the same time to defer sufficient young men for veterinary training as replacements to assure maintenance of needed professional services for the future.

## Closed Circuit Telecasts Draw Wide Interest

Television programs were of especial interest to all. Four programs attracted capacity attendance. These were made possible by the collaboration of the Allied Laboratories, Inc., and the Radio Corporation of America. These programs, clearly visible to large groups, prove the value of the medium for demonstrating clinical, surgical, and laboratory procedures. In addition, they were most newsworthy; wire-press bureaus and newspapers carried the story of these telecasts, as well as many other convention events, to people throughout the North American continent and other countries. The public relations aspect of this effort will most certainly be profound.

At the second session of the Section on General Practice, anesthesia demonstrations were televised. Narrators gave a running, descriptive account during transmission of the operations, mentioning drugs used, dosages, and other information. Two large screens set on either side of the rostrum made possible a good view of the demonstrations that were performed in especially prepared quarters in the convention auditorium. Other programs were shown during the sectional meetings on small animals, poultry, and surgery and obstetrics. In all, some dozen or more television demon-



(L. to R.) Dr. C. C. Moore, practitioner, Springfield, Mo., and Dr. Maurice A. Schooley, director, Armour Veterinary Research Laboratories, Chicago, Ill.

Presidents Dr. John R. Wells, Palm Beach, Fla., and Mrs. C. E. Bild, Miami, Fla., posed for VM's cameraman.

(L. to R.) Mrs. C. L. Miller, River Forest, Ill., and Mrs. A. E. Coombs, Skowhegan, Me., assist in arrangements for activities of the Women's Auxiliary.

strations were arranged, in addition to laboratory procedures in disease diagnosis conducted by the Section on Public Health.

## Scientific Program

Following the custom of previous years, the scientific program consisted of presentation of papers having wide current interest. The clinical sessions were largely presented by telecasts. Both served to give emphasis to current veterinary problems confronting different specialized groups.

In a discussion presented at the section on General Practice, Dr. Damon Catron, nutritionist at Iowa State College, Ames, stated that the mode of action of antibiotics at the feeding level remains obscure. These agents have been widely accepted but further research is essential to an adequate knowledge regarding their action and advisability of continued use at the levels now proposed.

Dr. J. W. Giffee stated that surprisingly small losses result from simultaneous vaccination for hog cholera considering the common error made by many vaccinators of attempting to produce effective immunity in animals suffering intestinal disorders and anemia.

According to a report made by Dr. C. A. Manthei, results of tests for resistance of cattle vaccinated with Brucella strain 19 vaccine indicate that long-time protection is afforded. He further reported that from evidence accumulated there is questionable need for revaccination. Doctor Manthei emphasized good management and sanitation practices as sound disease control measures.

A warning was sounded by workers in Wis-

## Animal Surgery Makes Television Debut

—Courtesy Milwaukee Sentinel

**Capacity audiences gave enthusiastic reception to four telecast programs, that made possible close-up views of technics as they were performed. These demonstrations were first in the history of television and veterinary medicine. Dr. L. K. Wayt demonstrating intravenous anesthesia.**

consin of possible confusion in the diagnosis of vesicular stomatitis with foot-and-mouth disease. The report prepared by Dr. C. A. Brandly and his associates pointed out that foot-and-mouth disease existent in many parts of the world could gain entrance in spite of precautionary measures now in force.

The possibility was also noted that mosquitoes and other insects may be responsible for spreading the virus of vesicular stomatitis.

Dr. C. K. Whitehair of Oklahoma A. & M. College, Stillwater, said that healthy pigs fed well-balanced rations did not exhibit significant growth stimulatory effects from the addition of antibiotic agents to these rations. The unthrifty or "poor doing" lots not receiving an adequate diet or who have survived an outbreak of infectious disease, respond to antibiotic and sulfonamide drugs at the feeding level by increased growth and gain.

Rinderpest of cattle, pneumoencephalitis (Newcastle disease) and fowlpest were singled out by W. A. Hagan as the diseases most likely to be spread by an enemy bent on waging biological warfare against meat animals. Foot-and-mouth disease was listed as a possible fourth choice of an aggressor.

Defense rests with local practitioners who are charged with the responsibllities of spotting unusual disease outbreaks and reporting them to state health authorities so that concentrated control measures can be set in motion.

Of especial interest was the report by A. L. Brueckner, director of the Maryland Livestock Sanitary Service, and co-workers at the Section on Research, that points to the relationship of the virus of pneumoencephalitis (Newcastle disease) and that of poliomyelitis. Preliminary infection of test animals with the virus of pneumoencephalitis appeared to cushion the severity of subsequent infection with the virus responsible for poliomyelitis in man.

Dr. I. A. Merchant, Iowa State College, Ames, in referring to animal diseases transmissible to man, stated that these diseases cause needless human suffering. Lack of public understanding of the nature of such animal plagues or pests is largely responsible for the spread from animals to man.

## New Immunizing Agents against Hog Cholera

In a discussion presented at the A.V.M.A. convention in Cincinnati in 1947, Dr. James A. Baker, now director of the new Cornell Research Laboratories, Ithaca, N. Y., outlined original experimental work on the attenuation of hog cholera virus by serial passage in rabbits. This method of attenuation by adaptation of a host specific virus to foreign tissue was successful in one strain of hog cholera virus. This virus, known as strain A, was furnished to a number of laboratories whose research staffs have been at work continually since that time testing whether an attenuated virus vaccine would fully immunize swine to subsequent exposure to virulent hog cholera virus, be inexpensive, and safe to use in herds which include susceptible animals not vaccinated.

Doctor Baker now reports that three laboratories have requested license for manufacture and sale of new hog cholera vaccines on the basis of wide laboratory tests and field experiments. These have by now been issued or are pending and products will be available, initially in limited quantities, for distribution immediately. At present immunity of limited duration only is claimed. It is expected that long-time protection will be afforded; exact data on this point awaits results of further field experience.

(L. to R.) Dr. O. F. Reihart, Omaha, Neb.; Dr. T. H. Ferguson, Lake Geneva, Wis.; and Dr. J. V. Lacroix, Evanston, Ill. Doctor Ferguson, age 78, has engaged in active practice for 55 years, having established himself in Lake Geneva in 1896.

One of these products, swivax,®[1] recently announced in a circular, is described as a modified live virus vaccine of rabbit origin. The product is vacuum dried to assure prolonged storage and must be reconstituted immediately prior to use. This product, as are other immunization agents, is intended for use on healthy swine. Work is now in progress to determine to what extent the vaccine may be used in exposed and infected herds. Swivax is recommended for use in pigs not earlier than two weeks after weaning and four weeks after the administration of serum. Stock kept for breeding should be revaccinated.

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®[1] Allied Laboratories, Inc., Indianapolis, Ind.

Another new vaccine, modified live virus hog cholera vaccine (MLV),[®a] is a vacuum dried product of porcine origin. According to the manufacturer, attenuated virus was readapted to swine in a manner that maintained its high antigenicity without the disease-producing potential of virulent hog cholera virus. When injected, MLV does not provide immediate protection such as is afforded by hog cholera antiserum. Demonstrations are reported to be extensive that antiserum may be used with the new vaccine without interference with the development of active immunity in vaccinated animals, thus incorporating the desirable features of the simultaneous method of vaccination without the use of virulent virus.

This product is offered in dried form with diluent for reconstitution before use. Until more information on the duration of immunity has been accumulated, animals kept for breeding should be revaccinated.

A modified live virus vaccine of rabbit origin, lapinized, is also to be offered to the profession under the trade name, rovac[®b]. This product is claimed to induce protection seven days following vaccination. No serum is recommended for use with rovac. This desiccated virus must be reconstituted with a suitable diluent and used immediately. Field tests on large numbers of hogs indicate that vaccinated animals withstand massive doses of virulent virus. There is no danger of untreated animals in the herd contracting the disease by exposure to those vaccinated with this product.

Professional care is required to assure the development of protective immunity by the use of these vaccines.

[®a]Fort Dodge Laboratories, Inc., Fort Dodge, Iowa.

[®b]Lederle Laboratories Division, American Cyanamid Company, Pearl River, N. Y.

## Committee Reports

In their report, the Committee on Nutrition sounded a note of caution regarding the widespread use of supplements added to mixed feeds. Fortifying livestock rations with vitamins, hormones, and antibiotics has not solved all animal nutrition problems. In instances where faster gains are effected by agents that appear to stimulate growth and gain, the problems of supplying additional basic nutrients to meet demands is presented. More investigational work is required to establish definitely the role of many of these agents for livestock feeding.

The report of the Committee on Parasitology cited the serious losses due to liver fluke disease in cattle and sheep. Phenothiazine was singled out for special mention as having promise as a non-toxic anthelmintic for continuous administration in feed for the control of nodular worms and hookworms of calves, and strongyles in horses.

## Women's Veterinary Medical Association

The activities of the newly formed con-

One of the educational exhibits, Veterinary Public Health at Work, depicts services of veterinarians in state and federal organizations.

stituent organization to include women veterinarians, of which there are more than 100 in the United States, include special conferences held during meeting dates for discussion of subjects of interest to the group.

Officers elected are: president, Margaret Sloss, Ames, Iowa; secretary, Estelle Hecht Geller, New York, N. Y.; treasurer, Lois Calhoun, East Lansing, Mich.; eastern vice-president, Patricia O'Connor, Staten Island, N. Y.; central vice-president, Joan Youngs Ziegler, Toledo, Ohio; southern vice-president, Hildegard L. Seelig, Asheville, N. Car.; western vice-president, Josephine Browne, Laramie, Wyo.

## Organizational Activities

In addition to the scientific sessions always the feature of annual conventions, meetings of the House of Representatives are held, at which policies are studied and adopted or discarded. At these meetings, plans for the future are made for the organization and the will of the majority is expressed for executive action.

Federal price controls, given new life by extension of the Defense Production Act to June 30, 1952, met vigorous opposition in the House. A resolution voted declares that "the veterinarians of the United States have become concerned over the imbalance and confusion created by government regimentation of business and industry . . . especially as such regimentation involves controls over prices of livestock industry products and services incident to the production of such supplies."

The resolution further pointed out that the growth of the nation's livestock industry has come about under a control-free system of private enterprise and that livestock growers are able to meet the nation's needs at fair prices under natural laws of supply and demand.

Confusing directives, superseded by more orders and rescinding of others, have growers and others interested in meat production in a dizzy whirl. Specially prohibited now are formerly imposed quotas on livestock slaughtering. Beef growers took one price rollback of 2 to 8 cents a pound, but additional cuts originally outlined have been abandoned. Now, the new laws fix ceiling prices on the basis of market prices early this spring. Actually, OPS efforts have been ineffective. High production of farm commodities, and new records being set, which include all crops as well as meat animals, have done more to halt price rises than government controls.

Seventeen colleges in North America for training veterinarians are now approved by the council on education. The Schools of Veterinary Medicine at the University of Minnesota and at Oklahoma A. & M. college have been added to the approved list since last year.

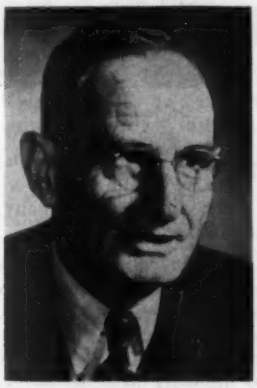
New colleges of veterinary medicine which have not yet been formally inspected by the A.V.M.A. council are located at the Universities of Illinois and California. Neither of these has graduated students.

## Atlantic City in 1952

Convention dates for the 89th annual meeting were set for June 23-26. Headquarters selected, the Ambassador Hotel, will house the sessions, section and group meetings, and commercial and scientific exhibits. Arrangements have also been made for rooms at the Ritz-Carlton and Chelsea hotels located immediately adjacent to the Ambassador. Facilities in Atlantic City for handling large conventions are the finest in the United States.

## Awards

Dr. R. S. Sugg, dean, School of Veterinary Medicine, Alabama Polytechnic Institute, Auburn, and state veterinarian of Alabama, received the International Veterinary Congress award. The work of Dean Sugg in helping to broaden educational opportunities in the South by developing the regional education plan for veterinary medicine, was cited. The plan was inaugurated in the Fall of 1949 at the Alabama school and since has developed to include 14 participating states. The plan makes possible the training of qualified men from states having no veterinary school and at the same time assures professional services for communities of such states needing them. Existing schools

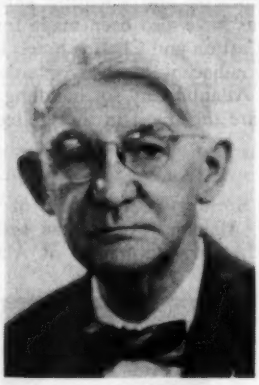


Dr. R. S. Sugg

are also enabled to improve their service and facilities and thus their educational standards.

The Borden Award for research on dairy cattle diseases was made to Dr. Louis A. Klein, of Moylan, Pa., who has devoted a lifetime to research and veterinary medical education.

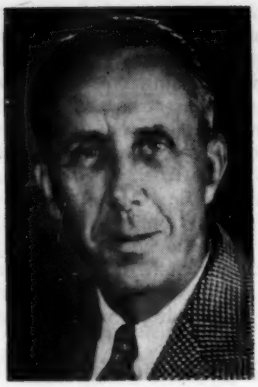
The citation which accompanied the award pointed to Doctor Klein's work in tick fever control studies at the beginning of the century, on the treatment of calf scours, research on prevention and treatment of mastitis of dairy cattle, and his contributions on pasteurization and basic improvement of public milk supplies. It was pointed out that during his career



Dr. Louis A. Klein

Doctor Klein has published approximately 30 scientific articles dealing with virtually all phases of milk sanitation and many aspects of dairy cattle disease control.

Dr. A. H. Quin, vice-president and director of professional services, Jensen-Salsbery Laboratories at Kansas City, Mo., was presented the annual American Veterinary Medical Association's National Award, certificate and medal, for his work in fostering better public understanding of animal health. The citation pointed out the value of his service in relations with farm and livestock groups. Doctor Quin has been a member of the A.V.M.A. Committee on Public Relations since 1944 and has served as chairman since 1947. He also has been a leader in his capacity as chairman of the Educational Committee of the Associated Serum Producers, a position he has held for ten years. Activities of this organization have been consistent and effective in setting before livestock growers, through the media of press and radio, value of veterinary services in animal disease control.



Dr. A. H. Quin

A boy who became a "one-man humane society" by rescuing dogs lost in the Mojave desert, finding homes for friendless pets, and conducting a newspaper and radio campaign to encourage kindness to animals, was voted the 1951 National Humane Act Award.

The boy, 16-year-old Burr Collett, Barstow, Calif., was awarded the official citation which carries with it a $100. U. S. savings bond and an engraved certificate.

Burr Collett, Barstow, Calif., and two not-so-friendless pets.

The citation presented to Burr Collett states that it is "In recognition of his consistently outstanding and unselfish accomplishments that helped to better the lives of hundreds of pets and that helped the City of Barstow to build a nationally respected reputation for kindness to animals."

The California youngster was selected for the top award from among nominations submitted from all parts of the United States and Canada.

## Women's Auxiliary to the A.V.M.A.

The objectives of the Women's Auxiliary include participation in matters of public relations, assisting worthy veterinary students, and strengthening bonds of friendly relations among wives of veterinarians.

New officers elected to serve the group are: president, Mrs. C. E. Bild, Miami, Fla.; president-elect, Mrs. H. S. MacDonald, Toronto, Ontario, Can.; 1st vice-president, Mrs. Russell A. Runnells, East Lansing, Mich.; 2nd vice-president, Mrs. L. R. Richardson, Ravenna, Ohio; 3rd vice-president, Mrs. Earl N. Moore, Trumansburg, N. Y.; secretary, Mrs. C. M. Rodgers, Blandinsville, Ill.; treasurer, Mrs. Charles C. Rife, Atlanta, Ga.; chairman, House of Representatives, Mrs. A. E. Coombs, Skowhegan, Me.; recorder, House of Representatives, Mrs. Lewis H. Moe, Stillwater, Okla. The retiring president, Mrs. Dennis Coughlin, Topeka, Kans., is also a member of the Executive Board.

## Zoo Veterinarians Meet

The sixth annual meeting of zoo veterinarians was held on the evening of the first day of the convention. Thirty veterinarians were in attendance.

Reports of successful treatment of zoo specimens of wild animals were presented by Dr. C. C. Rife, Atlanta, Ga., Dr. E. J. Frick, Manhattan, Kans., and Dr. Lester Fisher, Chicago, Ill. Doctor Fisher told of the detailed histological studies (12,000 slides) of the organs obtained at the autopsy of the famous gorilla "Bushman" which is being carried out by cooperating medical schools. Dr. R. W. Worley, South Bend, Ind., described the intravenous feeding of a lion cub for a five-day period. Dr. Donald Schmidt, Chicago, reported on a case of pneumonia in a sea lion and Dr. Patricia O'Connor, Staten Island, N. Y., secretary of the group, read a case report submitted by Dr. Frank McClelland, Buffalo, N. Y., on onchoceriasis in a chimpanzee.

(L. to R.) Dr. John H. Gillmann, Memphis, Tenn.; Dr. G. G. Graham, Kansas City, Mo.; and Dr. Kurt Wagener, Hannover, Germany.

## Commercial Exhibits

A greater-than-ever demand for exhibit space made necessary expansion of originally planned space to house this convention feature. Cooperation with the A.V.M.A. by convention exhibitors was given favorable mention in a resolution adopted by the House of Representatives. Commercial exhibits proved popular, as always, with visiting veterinarians. A great deal of preparation goes into the planning of these displays. Each has a message that serves to acquaint visitors with the new items in all lines of equipment, drugs, instruments, and other supplies practitioners use.

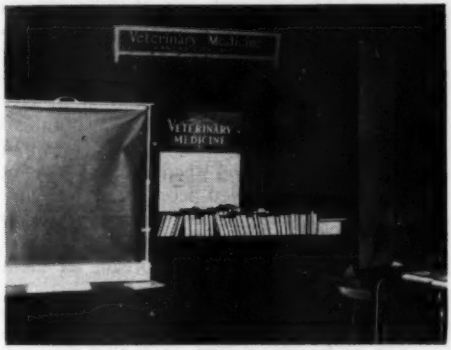



Exhibit booth of VETERINARY MEDICINE.

Dr. F. A. Hall, West Lafayette, Ind., won, by drawing, a beautiful set of luggage offered by the exhibitors group.

Commendation is due the Local Arrangements Committee, headed by Dr. K. G. Nicholson, for an excellent job of planning features that taxed the capacity of accommodations.

Except for a brief period of sultry conditions before a shower on the first day, Milwaukee weather was delightful during the convention week. Many extended their stay in Wisconsin for vacations spent touring the lake regions, fishing or just relaxing in one of the many resorts of the state.

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From conversations with practitioners, it is learned that the methyl silicones (these are organic compounds in which some of the carbon has been replaced by silicon) are being used with increasing frequency in the handling of alfalfa and clover bloat in cattle. These agents decrease surface tension of the rumen contents so as to prevent the formation of gas bubbles.

(*Guest Editorial*)

# The Influence Of Disease On The Swine Industry

S. H. McNUTT,* D.V.M., Madison, Wisconsin

DURING World War II the question was asked whether it was a sound policy to raise hogs during periods of stress inasmuch as swine consume grain that can be used more effectively in human diets. In contrast to swine, it was pointed out that ruminants consume large amounts of roughages, thus converting them into human food. It was recognized that information on the value of meat in the human diet did much to combat the idea that essential calories were lost by meat animal production. It was obvious that the fact that the quality of their food was improved was not adequate for semistarved people who were unable to get sufficient food of any type. One is reminded of the unfortunate historical saying, "If the people can't get bread, let them eat cake."

Perhaps for the sake of argument, those who raised this question intentionally omitted mention of the fact that swine consume large quantities of roughages and other feed unsuitable or unfit for human use. Such swine feed is being employed more and more extensively in the industry. In the pasture season of 1948, one of the Midwest's foremost swine raisers maintained a group of 100 brood sows on pasture alone, except for minerals and water. In the following two litters these sows farrowed an average of 16 pigs each that survived to marketable age and were sold. For these and other reasons it appears a reasonably sound policy to raise hogs even in periods of national crisis, notwithstanding the question has not been answered entirely and may influence swine production more in the future than it did during the late war.

### Death Losses from Disease

But on the matter of disease and death losses due to disease and other factors, the picture is not at all bright. It is a situation that disturbs greatly everyone who really understands it and has the true interest of the industry at heart. The U. S. Department of Agriculture estimated that there were nearly 60,000,000 hogs on farms January 1, 1950. On the basis of reliable information it is known that the farrowing of 75,000,000 to 90,000,000 live pigs was required in order to produce 60,000,000 hogs on farms. Thus 15,000,000 to 30,000,000 pigs had died. Furthermore, it has been established that a pig born dead or lost within the first week of life represents a loss of 100 pounds of feed; at later dates a correspondingly greater amount. From these elementary data one can readily estimate total loss—mortality only. The figure is truly astounding. What other business could survive a one-third loss between production and sale? Is not the swine industry in a precarious position? If these conditions are allowed to continue, can one expect the industry to operate in the future as it has in the past? It is perfectly obvious that it cannot adequately survive in periods of great stress. Already the industry is adversely affected. How long will it be before it is seriously affected if these losses are not corrected or at least ameliorated?

Regardless of assumptions to the contrary, less is known about the diseases of swine than of any other of our domestic animals. Advances are being made in the knowledge of swine production and control of swine diseases; but not sufficiently rapidly, because these diseases are increasing under the present system of swine production. It has been estimated that recent advances may correct as much as 10% of present losses provided the conditions do not spread more rapidly. That very thing is taking place. The diseases are increasing so rapidly that the industry has not held its own against them during the past decade. In this connection one notes the deplorable situation with respect to hog cholera during the past few years, and with the rapidly-spreading, ill-defined transmissible diarrheas.

Hog cholera, the most dangerous disease of swine, has received no appreciable research since the epochal work of Dorset and co-workers in 1907—over 40 years ago. When one considers all the variations and changes that occur in nature, it is truly astounding that hog cholera has not caused enormous losses previously, for it is well established that diseases do not remain static or unchanged. There

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has always been a moderate loss due to hog cholera even where supposedly adequate measures of immunization and control have been employed, but according to the U. S. Bureau of Animal Industry changes have now taken place in the nature of hog cholera that account for the great losses experienced recently. The swine industry was unprotected against such change, largely because the changes could not be recognized early. Had the disease been under constant study since its discovery, it is indeed likely that measures would have been ready and in use to prevent the unfortunate circumstance.

### Costs of Eradication *versus* Control

Current production of hog cholera antiserum and phenolized virus for the immunization of hogs against hog cholera exceeds a billion cubic centimeters per year. A comparison between eradication and "control" of hog cholera can be made. In 1946, the continued eradication of hog cholera in Canada cost $600., while the mere "control" in the United States cost between $30,000,000. and $40,000,000. These latter costs do not include those due to death from hog cholera. On a per animal basis it cost Canada less than one one-hundredth of a cent to maintain its status of freedom from hog cholera. On the same basis including losses from the disease and the cost of control measures, hog cholera cost the United States approximately $1. or 10,000 times the cost to Canada. The situation with regard to hog cholera is especially unfortunate because this is a disease that need not exist in the United States. It is especially vulnerable to eradication measures. It exists only because of inertia and laxity. Finally, it may be said that hog cholera has been kind to the industry until now, in view of our inadequate regard for such a killer.

### Significance of Other Swine Diseases

Although hog cholera is the disease causing most havoc in swine production, it is closely followed by that group of diseases in which diarrhea is a major symptom. Especially significant are the ill-defined, transmissible diarrheas. Whether these constitute a single entity, identified as transmissible gastroenteritis, or group of infections is not known. Nevertheless, it is known that these diarrheas are becoming widespread and have ruined many of the finest herds, which were a result of many years of selective breeding. These infections are often carried by apparently healthy swine to clean herds. Until recently it was observed they were always spread either by apparently healthy carriers or by sick pigs. This is no longer true. Herds closed to the introduction of other swine or to contact with animals have been infected by occult means. The inescapable conclusion is that these diseases are now so prevalent that they are spreading to clean, isolated herds as does hog cholera. Thus our knowledge of the second most important killer or killers among swine is meager and in some areas totally lacking.

In regard to these diarrheas, one must not be misled by the loose statements that appear occasionally in the scientific literature. One often reads that certain APF concentrates containing certain antibiotics "cure scours." These otherwise reliable writers have failed to employ their usual good judgment in their reports. They say in effect that the particular APF concentrate, with which they worked, cured all types of diarrhea regardless of cause. Time after time this has been shown to be false. APF concentrates when they contain antibiotics are known to prevent, and perhaps to cure, certain types of diarrhea, but are wholly without effect on other types. Such loose and misleading statements are a disservice to the swine industry, especially when written by reputable scientists. Overly enthusiastic statements are not confined to the scientific press, they are only more conspicuous when reported by scientists.

Exaggerated statements are appearing in the press on the great profits and advantages to be derived from the so-called "pig hatcheries." It is said that each sow kept at such "hatchery" can readily return $250. annually for her feed and care. Mention is made only of successful operators; there is no mention of those whose enterprises have been wiped out because of disease. Nor is the enormous potential of a "hatchery" for disease dispersion warned against. The efficiency of chick hatcheries in this respect, in their early days, appears to have been forgotten.

Much has been made of the scientific breeding of swine along genetic principles and rightly so, but it is well-recognized that such breeding stock is equally as capable of carrying disease as is ordinary stock. Furthermore, genetically bred stock is of great danger when diseased; far greater than the usual purebred herd because of its much greater dissemination among farm herds. As an example, an instance that occurred two years ago may be cited. One of these genetically bred boars was shipped 1,000 miles into a distant state and used in nearly 30 herds. This animal introduced a genetic defect into all these herds. In addition, this boar was infected with bru-

cellosis, and proved to be the source of infection in clean herds. Thus one animal caused widespread damage, even ruined some herds within the state.

Editors of reputable magazines have requested dependable authorities to write papers on this subject, that the public be warned against such hazards. It is perfectly clear that scientific breeding is no guarantee of freedom from disease or that a purebred, or a genetically bred, animal cannot be a vicious spreader of disease. At the present time, a single area covering parts of several midwest states is being seeded with atrophic rhinitis through genetically bred stock. This genetically bred stock is being distributed from one or more sources. In this instance, no effort is being made to correct the situation. Finally, it must be emphasized again that diseased hogs of scientific breeding are a much greater hazard to swine production than are the usual, infected, purebred herds since the former are employed over wide areas and in more herds. Therefore such diseased animals have a greater opportunity to spread infection.

### Better Industry-wide Organization Desirable

It would appear that there is not sufficient coordination and cooperation of the various segments or groups within the swine industry. This applies particularly to industry-wide planning and thinking. It is obvious that each individual is concerned with the details of his own particular phase with little if any consideration of the overall picture. Thus, the auctioneer deals with and thinks almost entirely of sales, the purebred raiser with blood lines and pedigrees, the packer with his immediate problems, injuries and jowl abscesses as he sees them in his yards, the swine association secretary with the keeping of records, and the hog raiser with his immediate problems of housing, heating plant, repair of fences, etc. He thinks of disease only if his own herd is affected. Then he is often amazed and unbelieving when told that the disease of his pigs is little understood or even undefined.

### Research on Swine Disease Inadequate

In a time of great advances in almost every field of medicine, it is truly astounding, almost unbelievable, that swine diseases are almost totally neglected if one compares the meager sums expended for swine disease research with the overall value of the industry. The average, annual farm income from the sale of swine accounts for about one-eighth of the total farm income.

**Farm Cash Receipts, United States**

*(U. S. BAE Bulletin—April 27, 1950)*

| Year | Total Cash Receipts from Swine | Total Cash Receipts from All Sources | Per Cent of Total from Swine |
|---|---|---|---|
| 1948 | $3,715,404,000. | $30,802,000,000. | 12.06 |
| 1949 | $3,225,488,000. | $27,704,000.000. | 11.64 |

The federal budget carries less than $750,000. for all research on swine, including breeding, nutrition, management, and all types of disease. When it is known that hog cholera alone costs more than $50,000,000. annually in the United States, it is obvious that the $750,000. would be a low budget for disease only, which, even in the above is one of the most poorly supported. Thus, the federal swine budget, of which some is expended in various states, represents but 0.025% of the total gross income from the industry. When disease only is considered, the funds involved are almost infinitesimal, compared to gross income. Just as a sick individual may appear on the surface to be healthy, so a "sick" industry may for a time appear perfectly healthy. So also, either or both may recover through chance or good luck, but are more apt to do so if properly treated. The impact of disease on the swine industry has been increasingly greater during the past 15 years. It is the studied opinion of those concerned that it is truly unsafe to continue to trust luck or chance. That method has already been thoroughly tried. Regarding this situation it is concluded that there are but two courses open; (1) adequate support for study and research on swine diseases, or (2) eventually discontinue the raising of swine on the scale now employed. The swine industry itself must decide whether it will solve this question by positive action in favor of (1) above, or will decide it by inertia and negative action in favor of (2) as it has in the past.

Should the industry decide in favor of *laissez-faire*, it must accept the responsibilities that go with such decision. Should the industry choose to enlist the aid of scientists readily available, the problem would be reduced and all would share the responsibility.

It has been repeatedly pointed out that the swine industry is perhaps the most loosely knit of any of our great industries—so loosely knit that there is little or no coordination of planning among those representing its various parts and there is no one who speaks for the entire industry on the national level. This is perhaps the great weakness.

# PRINCIPLES OF ANIMAL HEALTH

R. R. DYKSTRA, D.V.M.
Manhattan, Kansas

Liver biopsy in man has on a few occasions been mentioned in this column. In the June 16, 1951 issue of *The Veterinary Record*, Loosmore and Allcroft describe in detail the technic of this procedure as practiced by them in determining blood and liver copper values in cattle. The operation is performed under local anesthesia with the animal in the standing position. The site of the puncture is in the intercostal space between the 11th and 12th ribs, 6 to 8 in. from the dorsal mid-line. The trocar and canula are about 18 cm. long, and the canula has an external diameter of 5 mm. Its end is beveled down to a fine cutting edge. The instrument, trocar and canula, is introduced in a slightly forward direction, and the trocar is withdrawn at the point where the liver is entered, so that by a slight rotary movement the canula is advanced for 1 to 2 in.; the object being to imprison a core of liver tissue in the canula. Then a syringe is attached to the canula and as the latter is withdrawn, the plunger of the syringe is also slowly pulled out so as to hold by gentle suction the cylinder of liver tissue in the canula. The damage to the liver soon heals.

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More evidence is accumulating that warfarin, the commercial compound containing hydroxycoumarin (this is the active ingredient in sweet clover that is responsible for so-called "sweet clover disease" of cattle) is an efficient rodenticide. A corn meal bait containing 0.005% of warfarin, ingested by rodents for several succeeding days will result in internal hemorrhage and death of the rodent. Bait shyness is not noticeable. A single accidental dose to a child or domesticated animal would, unless an enormous amount is ingested, be harmless. At any rate, a therapeutic dose of vitamin K is the antidote. Rat control devices, so as to keep these rodents away from all food supply, should never be neglected.

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For the purpose of administering 4.5 gr. "reduced" iron tablets to pigs in the treatment of pig anemia, Doctor Schmidt of Worthington, Minn., uses a rubber tipped lead pencil, dipped in vaseline so that the pill adheres and it is thus placed at the base of the animal's tongue.

Clinical experience, and the results of research, indicate that the best antidotes for acute poisoning by the chlorinated hydrocarbon compounds, the so-called convulsant poisons such as benzene hexachloride, DDT, chlordane, etc., are phenobarbital and pentobarbital in combination. The former controls latent convulsions and the latter those convulsions observed at the time of treatment. Gastric lavage and emetics are also indicated. Antidotes for parathion and other organic phosphorus insecticides are atropine sulfate, oxygen, and postural drainage to relieve pulmonary edema. The effects of the latest rodenticide, warfarin, may be counteracted by vitamin K, administered three times daily, until normal blood clotting is restored.

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Bailey, in a lay article in *Hoard's Dairyman*, March 10, 1951, lists 14 causes of premature birth in cattle. They are as follows: (1) brucellosis; (2) vibriosis; (3) trichomoniasis; (4) various types of yeasts and molds; (5) external injuries; (6) injuries as a result of introducing an artificial insemination tube through the cervix of a pregnant cow; (7) injuries at previous calvings (forced extraction, forcible "cleaning", etc.); (8) various drugs (sodium iodide in lumpy-jaw treatment, etc.); (9) high temperatures or fevers; (10) nutritional deficiencies; (11) upsets in hormonal balance; (12) excessive loss of blood following injuries or surgical procedures; (13) so-called "lethal factors", usually of genetic origin such as "bull-dog head," "short spine," "hairlessness, etc.; (14) virus abortion. It is an impressive list.

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The Quarter Horse in the early colonial days was a cross between Spanish and native English stock, though later some imported English stallions and mares were crossed with Spanish horses to produce the heavily muscled, compact animal that could run faster for a short distance (quarter of a mile) than any other known breed. After the Thoroughbred became established in the United States, the short races lost much of their popularity so that the Quarter Horse moved to the Southwest to become the accepted greatest cow horse in history. As a short distance runner and as a cow horse, the Quarter Horse of today has maintained this supremacy.

# VETERINARY PARASITOLOGY

A. O. FOSTER, B.A., M.A., Sc.D.
Beltsville, Maryland

## Canine Toxoplasmosis

Since the recent review by Langham and Sholl,[9] at least two new cases of canine toxoplasmosis have been described from the western world[9,10]. These new reports by Grocott, of Panama, and Jasper, of California, not only emphasize the sporadic occurrence and importance of this disease in both man and animals, but are excellent and detailed clinicopathological studies. Practitioners wanting to sharpen their diagnostic acumen for the unusual will find it profitable to study them. Little is known about the nature, development, occurrence, and transmission of the organism, but both authors emphasized the ubiquitous distribution of the organisms in the tissues, the severity of the disease, and the possibility that toxpolasmosis may be more common than generally supposed.

The dogs, in both instances, were young and under treatment with antibiotics and other agents at the time of death. Fever, vomiting, and inappetence, with respiratory symptoms, appear to be prominent clinical manifestations. Neither case was diagnosed as toxoplasmosis until histological examination was made. Grocott cited the possibility that dogs may serve as reservoirs of human infection, and that the disease may be transmitted by direct contact or by insects, ticks, or mites. The possibility of infection through the alimentary tract was mentioned by Jasper.

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## Advantages of Hornfly Control

Intangible losses from parasites, whether internal or external, are known to be large although especially difficult to appraise. To determine such loss, a test of the effect of hornflies on weight gains and milk production was carried out in western Canada,[1] using dual-purpose cattle. Animals from two herds were divided randomly into two groups. The test animals were sprayed on June 24, July 13 and August 12 with 0.24% DDT, 2 qt. per animal at 400 lb. pressure. The check group was not sprayed. Control of hornflies was excellent, the animals remaining nearly fly-free.

It was concluded that: (1) DDT is effective for control of hornflies; (2) an advantage of 30 lb. per beef-type animal may be expected in summer weight gains of animals protected from hornflies; (3) an increase of 20-25% can be expected in milk production; and (4) at an average figure of 17 cents/lb., there may be an annual loss of $30,600,000. in the 6,000,000 beef animals of Canada. It will be recalled that Cuff reported an average advantage of 73 lb. per head in Kansas from hornfly control and that Kelly, in the same state, noted that this practice appeared to give an additional 30 lb. per head during the summer.

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## Lindane for Control of Ear Mange in Rabbits

"The most economical and effective preparation known for the treatment of ear mange in rabbits is a 0.25% solution of lindane in vegetable oil[2]." The preparation is applied with a cotton pledget, swabbing the inner surface and folds of each ear, then squeezing the pledget to permit the material to run down to the ear drum and fill the auditory passage. When the disease is present in a hutch, all animals should be treated, beginning with the least affected. Animals whose ears show crusts should be treated last, after first softening the scales with oil and removing the debris.

A single, thorough treatment results in complete eradication and is entirely safe, although individuals making the applications should wear rubber gloves to avoid absorbing toxic amounts of lindane.

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A report from Jamaica, B.W.I.,* indicates that internal parasites of cattle are controlled by the addition of phenothiazine to mineral supplements, using a 1:13 ratio.

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[9]Grocott, R. G., *Am. Jour. Trop. Med.*, 30:669, 1950.

[10]Jasper, D. E., *Jour. Am. Vet. Med. Assn.*, 118:22, 1951.

[10]Langham, R. F., and Sholl, L. B., *Am. Jour. Path.*, 25:569, 1949.

[1]Skaptason, J. S., Effect of Horn Flies on Prairie Cattle. 18th Ann. Rept. Entom. Soc. Ontario (1949), p. 46, 1950.

[2]Lund, E. E., *Am. Rabbit Jour.*, 21:67 (May), 1951.

*Anon. *West Indian Vet. Conf.*, 1:6, 1947.

# POULTRY PRACTICE PROBLEMS

W. R. HINSHAW, D.V.M., Ph.D.
Frederick, Maryland

## Salmonellosis Dangerous to Human Health

The possibility of Salmonella types isolated from poultry or poultry products being pathogenic for man has been a subject of discussion in poultry industry circles for a long time. Even some bacteriologists have maintained that Salmonella types identical to those that have been isolated repeatedly from outbreaks of food poisoning in man, if isolated from poultry or poultry products, could not be considered pathogenic. Such views have tended to hold up progress in control of salmonellosis in poultry, so the recent report on the pathogenicity for man of strains of two types of this genus of bacteria isolated from sprayed whole dried eggs by McCullough, *et al.*, (*Jour. Inf. Dis.*, 88:278, 1951) should help to clear up the unfortunate confusion which has existed.

McCullough and his associates at the University of Chicago, utilized prisoner volunteers to study the pathogenicity of three strains each of *Sal. meleagridis* and *Sal. anatum*. Healthy, non-food handling inmates of a penal institution were each fed the cultures in a glass of eggnogg shortly following the noon meal. The men were interviewed and observed three times a week for a period of two weeks, and at least once a week thereafter. When necessary, the patients were hospitalized, otherwise no restrictions were placed on the men. Detailed records on each case were kept, and are recorded in the report. All six strains produced human illness.

A total of 32 clinical cases of salmonellosis were observed during the feeding experiments during which 233 separate feeding trials were made. They varied greatly in incubation period, severity, duration and clinical characteristics. Twelve patients were ill enough to be hospitalized. The incubation period in three-fourths of the cases was from 20 to 48 hours, and ranged from eight to 72 hours. The patients exhibited typical salmonellosis ranging in severity from mild, brief enteritis to serious prostration. The infective doses varied from strain to strain in the same species, as might be expected.

Of great significance is the fact that the number of organisms required to produce disease was in all instances within the range that might normally be encountered in food products. When *Sal. meleagridis* was used as the infecting agent, from 8,000,000 to 50,000,000 organisms were required to produce clinical illness. Even greater variation was noted in the *Sal. anatum* strains where the extremes were from 587,000 to 67,000,000 organisms required to produce clinical symptoms. These results are not unusual, and represent normal variation of virulency in Salmonella strains. In each species there was one strain which required many times the number of organisms to produce the disease.

The asymptomatic carrier states produced by the six strains were also typical. In general, a higher percentage of carriers was observed in the patients receiving the larger dosages. A total of 81.4% of 118 men fed *Sal. meleagridis* yielded cultures from feces. The maximum number of days that the organism was shed was 128 days and the average duration was 14.7 days. In case of *Sal. anatum*, 74.8% of 115 men shed the organism for as long as 107 days with an average duration of 10.7 days.

The results reported by these writers should make it evident to even the most skeptical individuals that Salmonella infections of poultry and poultry products are of public health significance. Too much time has been wasted already by industry groups and poultry produce groups, who have tried to sidestep the real issue by assuming that types of this organism isolated from poultry and poultry products are different than those isolated from man. McCullough and his associates have done a fine service to the poultry industry by this and other research work to be reported by proving beyond all doubt that Salmonella isolated from poultry products are dangerous to human health.

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Moniliasis mycosis of the crop as a cause of mortality in young turkeys is discussed by Blaxland and Fincham (*Brit. Vet. Jour.*, 106: 221, 1950) in a report on five outbreaks encountered by them. *Candida albicans* was found to be the cause, but other debilitating and unhygienic factors probably influenced the losses. The writer also has had similar experience with this disease in young turkeys. In most instances, losses from moniliasis subside when sanitation is improved and better feeding practices are inaugurated.

# CLINICAL REPORTS

## Possible Warfarin Poisoning

I. G. BIRCHER, D.V.M., Rochester, New York

This report is submitted in the hope of obtaining an accurate diagnosis of this case.

Tuesday evening, March 13, 1951, a black Cocker Spaniel, spayed female, nine years of age, was presented for diagnosis and treatment. The owner gave the following history:

Dog apparently normal the preceding day, until about 1:30 p.m., at which time the animal began to vomit blood. Vomition continued through the night and Tuesday, through the day until the dog was brought to the hospital about 8:30 p.m.

### Symptoms

The animal was listless, with pale conjunctiva, temperature of 101 F. (blood on thermometer); pulse fast and wiry; breathing slow. Abdomen seemed quite flaccid. There was no evidence of pain anywhere on palpation; no soreness in throat or mouth.

Diagnosis was withheld but the possibility of poisoning by warfarin was considered, as well as possible accidental trauma or puncture by foreign body in the anterior portion of the digestive tract. Prognosis was grave.

### Treatment

An injection of 2 cc. of koagamin® (parenteral coagulant) was administered intramuscularly. Sulfaguanadine, 2 gm., and 50,000 units of penicillin were also given.

The dog was then placed in a kennel, where it immediately vomited a quantity of red blood (enough to spot kennel walls and soak the ears and feet of the patient).

Upon examination the following morning, the kennel man stated that about a pint of blood had been vomited or passed in the kennel during the night, but vomiting had ceased before 7:30 a.m. Temperature at this time was 101 F. (red blood on thermometer), dog still listless; conjunctiva pale. Sulfaguanadine and penicillin were repeated.

On the second hospital day, the animal acted a little brighter. Temperature was unchanged. Blood was again noted on the thermometer. Conjunctiva nearly normal pink. Treatment as prescribed on preceding day was repeated.

Dog ate a few bits of food by hand feeding and that evening ate some canned meat. Improvement continued for the following three days and the dog was discharged on the fifth day, at which time it appeared normal; appetite satisfactory.

### Summary

In 20 years of practice, I have never seen a dog that had vomited blood from the mouth and passed blood from the rectum for over 24 hours in such quantities, recover.

Did this animal ingest some of the new type rat poison (warfarin) that causes death from hemorrhage? The writer realizes that his treatment may have been inadequate. However, if the case was one of poisoning, then, in this instance, the 2 cc. of koagamin given to control hemorrhage may have served as an antidote.

The writer would be pleased to correspond with any practitioners having similar experiences with hemorrhage into the intestinal tract and information as to results to be expected following the use of a coagulating agent.

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## Chronic Pancreatitis in a Dog

CHARLES HODDER, D.V.M., Detroit, Michigan

A cryptorchid, miniature Poodle, one year of age, was imported from France in July 1950. His general condition was good on arrival. In October, the dog was noted to be unthrifty. Loss in weight had occurred despite a voracious appetite. The animal was reported to have eight or nine copious bowel movements daily. Temperature, pulse and heart action were normal. An oily discharge was observed on the perianal hair. Feces were grey and greasy and had a rancid odor. Microscopic examination revealed many large globules of undigested fat. The patient's urine was colorless, specific gravity 1.032; no albumin nor sugar present.

Clinical diagnosis was chronic pancreatitis. According to Christian,[1] the main factor in this disease is infection of the pancreatic ducts, which may be due to infection of the bile ducts and gall bladder. The resulting stasis which accompanies the infection of the bile ducts and gall bladder is a contributing factor to this disorder. The pancreatitis of this patient was probably dyspeptic. In other words, the infection of the pancreas was probably due to a morbid condition of the bowel with symptoms confined mainly to alterations in digestion.

Berk[2] recommends a diet high in calories, protein and carbohydrates but low in fat as a

®Chatham Pharmaceuticals, Inc., Newark, N. J.

supplement to therapy. This animal was given a diet consisting of 2 oz. lean meat, 2 oz. strained vegetables and 4 oz. wheat bread, twice daily. One tablet of pancreatin compound containing 10 gr. pancreatin and 1.5 gr. extract of ox gall was administered after each feeding. This treatment was continued for ten days with but slight improvement. At this point, medication was changed. One-half dram panteric granules® were given in the feed three times daily. One desicol kapseal® (equivalent to 2.5 cc. of gallbladder bile or 25-35 cc. of liver bile) was administered three times daily after meals. One abdol capsule® was given daily. Except for addition of skim milk or cottage cheese, the diet was unchanged. However, feedings were offered three times daily.

Pancreatic enzymes should be enteric coated to safeguard their passage through the stomach, as gastric juices destroy them[3]. It was for this reason that panteric granules were administered.

Within a few days after change in treatment, the feces were less copious, odor less rancid, and the patient exhibited more vigor. Diet and medication are still being continued. At the time of this report, the dog is active and has regained his lost weight. Stools are practically free of fat and on an average, two bowel movements occur daily.

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## Clinical Studies on the Use of New Terramycin Ophthalmic Preparations

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A great deal has been heard recently about terramycin, which is the newest antibiotic released for veterinary use. It has proved successful in the treatment of systemic infections in small animals, when administered orally or intravenously.

This report deals with terramycin as it has been used in the writer's practice; principally in anomalies of the eyes in dogs and cats.

Material was supplied in two forms: ophthalmic ointment (⅛ oz. tube), each gram of which contains 1 mg. terramycin hydrochloride; and ophthalmic solution. The solution was supplied as a dry mixture of crystalline antibiotic. Sodium borate-sodium chloride buffer was furnished for preparation of a solution for topical use. Each 5 cc. vial contained 25 mg. of terramycin, which was dissolved in 5 cc. sterile water. Each cc. of solution, therefore, contained 5 mg. of the active agent.

Ophthalmic preparations of terramycin have been used on about 25 cases; some of which had failed to respond to other ophthalmic preparations. Presented are a few of the most interesting cases, which may be considered typical.

*Case 1.* A male English Bulldog, eight years of age, was brought in for examination. This animal was developing a melanotic keratitis. The condition was advanced in the right eye, while the left eye showed many vessels growing into the cornea from the limbus. Little pigmentation was evident. The disease process had been treated with various ophthalmic preparations for some time without relief of symptoms. A copious discharge persisted.

A diagnosis of melanotic keratitis was made and *x*-ray therapy scheduled. The dog was treated as an out-patient and terramycin drops were given to the owner with instructions that they be administered two to three times a day. In five days, the animal was returned for treatment, at which time the eyes were visibly improved. The ocular discharge had stopped "almost over night" with immediate relief of discomfort. It is considered that the *x*-ray treatment effected ultimate clearing of the eyes. The prompt relief from discomfort must be credited to the antibiotic wash. At this writing, the left eye is completely clear; the right eye improved, though pigmentation persists. The owner is well satisfied with the results and is continuing the administration of the collyrium at home.

*Case 2.* A young cat had been treated for an obstinate chronic conjunctivitis for some time. Ointments containing various antiseptics and antibiotics had afforded little relief. Terramycin drops were administered and were effective as long as used. Once the drops were discontinued, however, conjunctivitis recurred. No reactions of any kind have been observed after prolonged treatment. No cause can be determined, but the use of terramycin drops has been followed by the best results so far obtained.

*Case 3.* A two-month-old Cocker Spaniel was presented for surgery on the Harderian gland. A complicating severe conjunctivitis suggested delay of surgery. Ophthalmic ointment was dispensed with instructions that it

[3]Parke, Davis & Company, Detroit 32, Mich.

be applied three times a day. The dog was returned for surgery in four days. At this time, symptoms of acute infection were absent. After surgery, ointment was again dispensed and the owner called four days later to inform us that recovery was rapid and uneventful.

*Case 4.* An eight-year-old mongrel bitch had been treated for some time for acute conjunctivitis. Terramycin ophthalmic ointment was prescribed, to be applied to the eyes twice a day. Inflammatory processes appear to be relieved as long as the ointment is used but recur when discontinued. No treatment has ever been completely effective.

*Case 5.* A six-year-old female Cocker Spaniel was brought to the hospital showing a severe traumatic keratitis due to a tumor in the upper lid. Terramycin ointment was applied pre- and postoperatively. Uneventful recovery occurred in five days.

*Case 6.* A mongrel male was brought in with the right eye swollen. The animal was obviously in severe pain. Terramycin ointment was used in the eye since it was almost impossible to apply solutions. There was definite relief within two hours. No other treatment was used. In four days the eye appeared to be completely normal. No keratitis followed, as it often does in similar cases. The terramycin ophthalmic ointment used seemed to give the quickest results of any of the preparations previously employed.

*Case 7.* A four-year-old Pomeranian kept at the hospital developed a severe iritis one morning, accompanied by profuse discharge. Hemorrhage developed in the middle of the cornea due to the constant rubbing and pawing. Rapid recovery followed treatment with terramycin ointment with no resort to supportive treatment ordinarily employed. The discharge quickly ceased and the iritis began to clear up rapidly. The most important factor was almost immediate relief of pain and irritation.

### Discussion

From the results of preliminary work done with terramycin solution and ointment, it is felt that these preparations are superior for the treatment of infections involving eye structures. It has been observed that relief from pain and photophobia is prompt. Discharges appear to clear up rapidly and the animal returns to normal in a short time. Terramycin solution has given best results in most cases, but must be repeated more frequently than when the ointment is used, for consistent results.

No systemic reactions nor untoward results have been experienced in any case, even when this medication is used continually for as long as six weeks.

### Summary

1. Seven cases, typical of about 25 treated with terramycin ophthalmic ointment and solution, are presented.

2. Results are considered excellent in five, with fair results in two.

3. Both preparations are considered effective in most common conditions affecting the eyes of pet animals observed in our practice.

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Lousiness of cattle is the problem of many veterinarians during the cold season. The lice involved are both biting and sucking varieties. The former is the smallest and of a red tinge; the latter or suckers are represented by the two long-nosed and one short-nosed blue louse. In housed animals, close clipping on a monthly basis, plus sanitary premises, will control the trouble. Usually however, insecticides in powder form are indicated. One of the most effective of these is the combination recommended by Telford, *et al.*, consisting of phenothiazine one part, sodium fluosilicate two parts, flour five parts. (Sodium fluoride and sulfur may be substituted for the sodium fluosilicate and flour respectively.) In proper dilution, lindane, and chlordane are also effective. They are commercially available.

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Though important, motility of sperm is an inadequate guide to quality of equine semen.—*Floyd Sayers, D.V.M.*

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## A Study of Canine Fecal Examinations

(*Continued from page* 382)

tion method gives a fairly accurate answer to the question; the smear is usually a waste of time.

Clients are always urged to bring stool samples along with their dogs. Many have periodic fecal examinations made. Each client is given a ¼ oz. tin box in which to bring a sample at his next call, and all are happy to cooperate.

### REFERENCES

1. Whitney, Leon F., A Study of 1000 Fecal Examination Reports. *Vet. Med.*, 31:104 (Mar.), 1936.

# Veterinarians Were Forgotten Men . . .

Some years ago, a speaker at a veterinary convention declared:

*"We veterinarians are the forgotten men among the professions."*

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# VETERINARY ITEMS OF INTEREST

Long-haired furs are regaining lost popularity.

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Consumption of poultry in the United States has doubled within the past decade.

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The hot dog and hamburger take top sandwich honors according to *Look* magazine article, The Great American Sandwich. Americans eat some 50,000,000 sandwiches a day, in varieties numbering 946.

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According to a farm study conducted by the University of Illinois, the average investment in land, buildings, machinery and equipment on Illinois farms is $45,000. per man. This is more than three times the average amount industry has invested per employee.

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Sanction of artificial insemination of dogs has been given by the American Kennel Club by registering litters so produced, providing normal mating could not be consummated. A further provision is witness by persons acquainted with both sire and dam.

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To emphasize increasing new domestic markets for all farm products and manufactured goods, *Doane's Agricultural Digest* points out that: "Last year this nation picked up the equivalent in population of another state such as Mississippi or Washington. In six years, we have taken on the equivalent of all the people in Canada to feed, clothe, and supply."

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Growth rate was increased nearly 100% when antibiotics were added to the diet of weak, unthrifty pigs in BAI experiments at the Beltsville Station. Increase in healthy, well nourished animals was no more than from 10 to 20% and in some instances normal pigs exhibited no growth stimulation by any of the antibiotic feeding supplements.

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Hog raisers are cautioned by the Eastern Iowa Veterinary Association bulletin to guard against introducing infectious swine diseases, including hog cholera, onto their farms. The most important measure recommended to avoid costly losses is to quarantine all newly imported swine for 30 days with strict segregation. The next is to insist that all visitors disinfect their footwear before entering the hog lots and houses.

## The Rodeo—an American Institution

Rodeos provide, throughout the summer, excitement and thrills of fast action that entertain crowds in many cities everywhere. These contests are truly American, having originated in the 60's by Texas cattle trail riders. When southern cattle herds were driven northward to fatten on the native grasses from the flint

*Authenticated News*

hills of Kansas to the Wyoming plains, young and daring drivers entertained townsmen along the way. For a small reward, they would climb aboard any animal to show their skill and prowess.

The modern rodeo continues to attract large audiences of all ages. Contestants are compensated by money prizes. They usually pay a fee for each contest entered and receive no set pay for their performances. Strict rules govern all events.

The cowboy, in the picture above, riding Joe Louis at the Cody, Wyo., Wild West Stampede, was thrown one second after the picture was taken. Note the broken cinch strap.

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Experimental evidence presented by Markham, Battorff and Cox (*Cornell Vet.*, 41:267 [July], 1951) fails to justify the practice of delaying vaccination of chicks against pneumoencephalitis (Newcastle disease) because of parental immunity or failure of chicks to respond to vaccination.